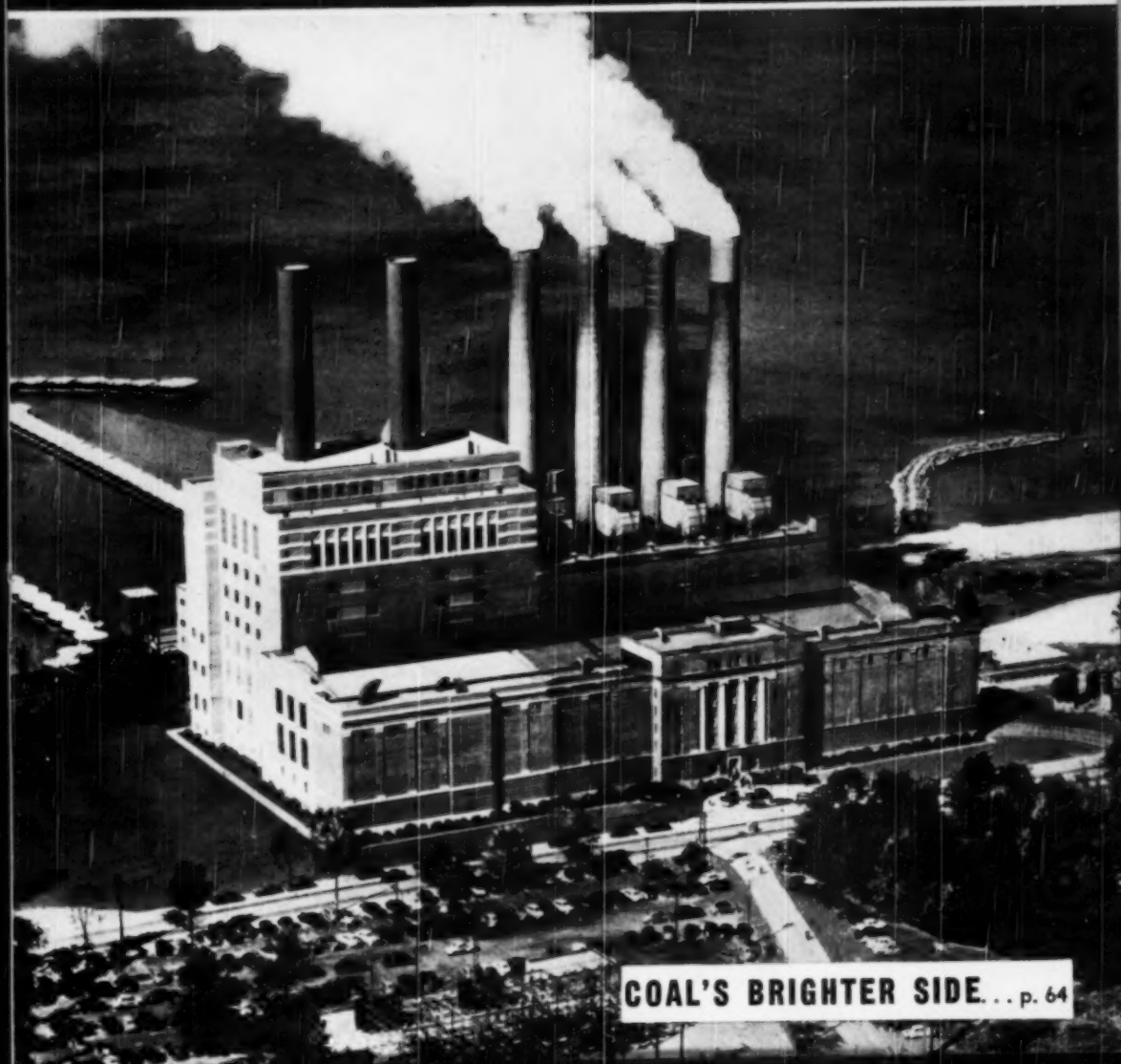


Coal Age



COAL'S BRIGHTER SIDE... p. 64



Mechanical Mining Needs **MINE CARS**

It's been proved so often that nobody really doubts it any more...modern mining machinery is a sound, profitable investment.

But long haulage delays can make that profit vanish right into overhead!

A properly planned mine car system cannot only handle all the coal your machinery can cut...it can do it without ever

stopping the flow of coal for more than a minute or two!

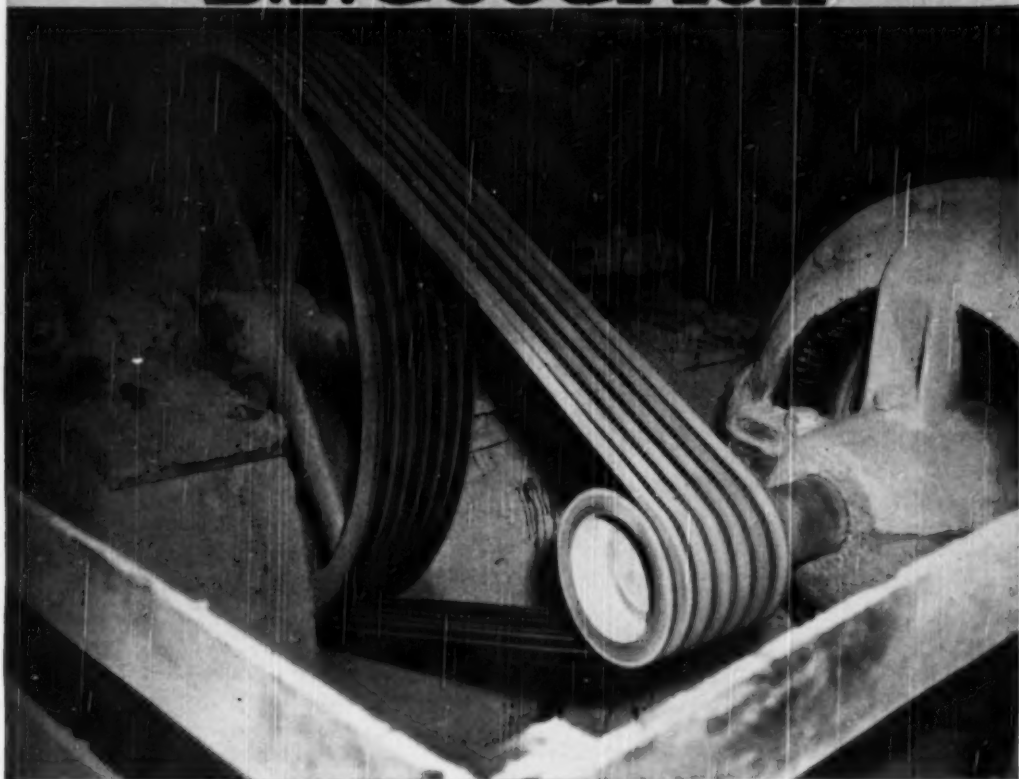
When a mine car needs attention, you just pull that one car onto a siding. Repairs are generally inexpensive...your maintenance men can do most of the work on the spot. But what's far more important—the rest of your mining operation keeps going at full speed! Cutters, loaders, processing machinery—and men—keep working without a break. When a mine's equipped with mine cars, the coal keeps moving!

A.C.f. MINE CARS

Let your A.C.f. Sales Representative explain the advantages of constant coal haulage with mine cars. American Car and Foundry Company, New York • Chicago • St. Louis • Cleveland • Philadelphia • Washington • Huntington, W. Va. • San Francisco • Pittsburgh • Berwick, Pa.

for Constant Haulage

B.F. Goodrich



Where a change to grommet V belts saved \$100 a month

THIS drive turns a ball mill containing 22 tons of steel balls, water and ore that grind until the mineral can be separated. Six ordinary belts weren't enough. They were falling to pieces from overwork.

But there wasn't space to expand, and redesigning the drive would cost \$800. Ordinary belts lasted only 5 or 6 weeks, replacement costs were over \$100 a month. B. F. Goodrich grommet multiple-V belts were installed, are in their sixth month of service, still in good condition. Here's why the grommet construction reduces V belt costs:

No cord ends — A grommet is endless, made by winding heavy cord on itself to form an endless loop. It has no overlapping ends. Because most of

the failures in ordinary V belts occur in the region where cords overlap, the endless cord section in a grommet V belt eliminates such failures.

Concentrated cord strength — All of the cord material in a B. F. Goodrich grommet multiple-V belt is concentrated in twin grommets, positioned close to the driving faces of the pulley. No layers of cords to rub against one another and generate heat; cord and adhesion failures are reduced.

Better grip, less slip — Because a grommet is endless, a grommet V belt is more flexible, grips the pulleys better. Size for size, grommet multiple-V belts will give $\frac{1}{3}$ more gripping power, pull heavier loads with a higher safety factor.

Only B.F. Goodrich has the grommet! — No other multiple-V belt is a grommet V belt (U. S. Patent No. 2,233,294). At present made in D and E sections only. See your local B. F. Goodrich distributor. Ask him to show you his "X-ray" belt that illustrates grommet construction clearly. The B. F. Goodrich Company, Industrial and General Products Division, Akron, Ohio.

Grommet V Belts BY
B.F. Goodrich
FIRST IN RUBBER

The Champion

LEADER IN MODERN MEDICINE!



Once laughed at as mumbo-jumbo, the art of the savage Medicine Man is regarded with awe by modern medical researchers. From the bark of the chichona tree, with which he fought fever, came quinine. He gave us digitalis for heart trouble; for pain he administered willow bark, one ancestor of aspirin! From his brew-pot we got ipecac, curare, ephedrine, cascara-sagrada. To combat snakebite, he invented "immunization" (modern vaccination). His treatments have healed face burns where modern science failed. We use rotenone against insects—he did it first! Another primitive remedy actually checks cancer in mice—while the latest "discovery" to date, neutralizes polio virus. Even his fearsome getup and wild dancing foreshadowed modern therapy by mental suggestion. Every day the Medicine Man gains in stature as all-time Champion of the medical profession!

HULBURY OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

The Champion

...IN COAL MINE LUBRICATION

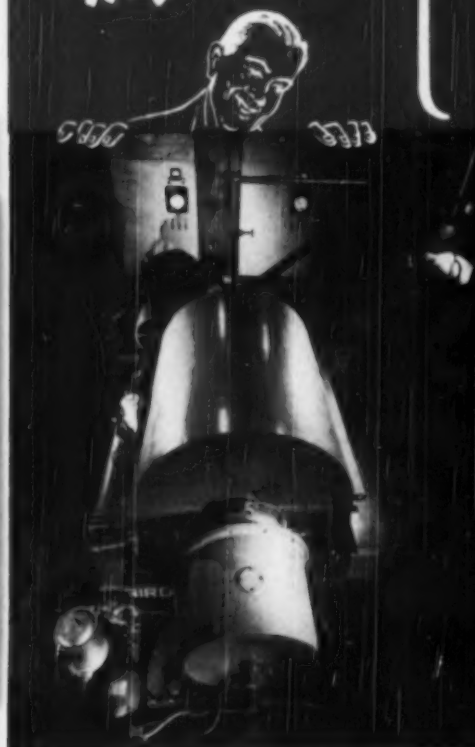


Hulburt *Quality* **GREASE** *"The Champion"*

Veritably, we're Medicine Men for lubrication ills in the coal mine—and our remedy is the tried and proven HULBURT QUALITY GREASE! Year after year Hulburt Grease gains in stature in the estimation of modern coal mine operators. Hulburt Grease has cured lubrication troubles that looked hopeless... call in a Hulburt Lubrication Engineer and let him immunize your mine from further breakdowns and delays.

**You're Looking
At The Best
Way To...**

- 1 Get your fine coal dry — the driest obtainable by any combination of mechanical equipment.
- 2 Operate your fine coal preparation set-up with a closed water circuit.
- 3 Get the extremely fine, high ash slimes out of the coal and out of the water.



This Bird Coal Filter and another just like it dewater the minus 16" but slime-free coal that has been cleaned in a jig, delivers it exceedingly dry and returns the water for re-use so clean that the water circuit is closed.



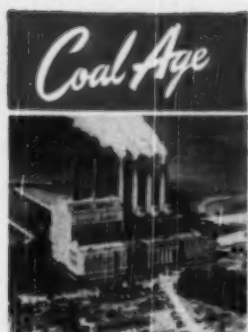
These Bird Polishers take the slimes out of the water so that the water may be re-used without getting these undesirable high ash fines into the good coal.

Why not find out what Bird Coal Filters or Polishers or both can do to give you maximum recovery of driest fine coal minus high ash fines and with a closed water circuit.

BIRD MACHINE COMPANY, South Walpole, Massachusetts

The BIRD

**Continuous Centrifugal
COAL FILTER**



THIS MONTH'S COVER

ONE OF COAL'S MAJOR CUSTOMERS is the utility industry, as typified by this Avon plant of the Cleveland Electric Illuminating Co., some 20 mi from Cleveland. With a capacity of 400,000 kw, this plant burns 4,000 tpd of pulverized bituminous, or 600,000 gal of oil. Its total consumption in 1949 was 2,572,672 tons. For the full story of coal's immediate and long-range future, see pages 62 through 69.

COMING IN SEPTEMBER

● **Better Labor Relations**—Ways and means of reducing strikes and slowdowns and promoting employee cooperation through better planning and organization.

● **Roof Bolting**—How Boone County Coal Corp. goes about roof bolting and what the results have been in higher efficiency.

● **Fine-Coal Preparation**—Froth-flotation methods and results at an anthracite colliery — Sludge-recovery methods and results by heat drying in Illinois.

● **Stripping**—How new shovel design facilitates stripping without shooting in Indiana and, in addition, a proposed system of scraper stripping for both higher efficiency and improvement of marginal land.

● **New Mining Development**—A round-up of recent advances on mining, preparation and safety, presenting thumbnail sketches of new developments that promise significant benefits in the future.

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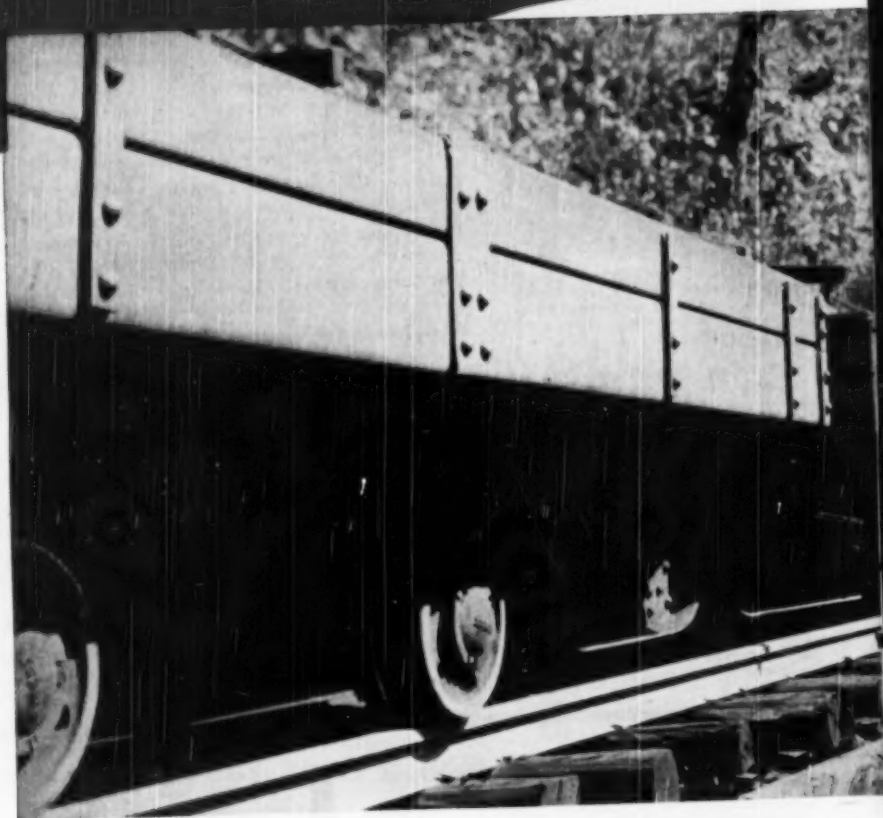
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START YOUR TRAINS
STOP HIGH



TEXACO LUBRICANTS

August 1950 • COAL AGE

EASIER

MAINTENANCE COSTS



Lubricate mine car wheels with **TEXACO OLYMPIAN GREASE**

FOR a lubricant that's a real "helping hand" in getting your trains started easily — winter as well as summer — use *Texaco Olympian Grease*. It's ideal in all seasons for all types of car wheel bearings — plain, cavity hub or anti-friction. It *stays in* the bearings . . . both starting and running torque are always low.

Texaco Olympian Grease has exceptionally high oxidation resistance and does not separate in use or in storage. It seals out dirt and moisture and maintains its protective lubrication far longer than ordinary greases. Thus, bearings last longer, maintenance costs come down. *Texaco Olympian Grease* is made in three consistencies to meet every mine car requirement.

In hydraulic mechanisms, use *Texaco Regal Oils (R & O)* to assure smooth, trouble-free operation and lower maintenance costs. These turbine-grade oils inhibit rust, sludge and foam.

Improve efficiency and reduce machinery maintenance costs throughout your mine. A Texaco Lubrication Engineer will gladly help you. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

For the Coal Mining Industry

GOODMAN TRACTOR TREAD LOADERS



SEE THEM IN ACTION

NEW 12000 LB. TREAD LOADER

Introducing Goodman's new 12000 lb. tread loader with 18 foot capacity. It's built with fully hardened and hardened components. No extra supporting structure. Proven loading efficiency. Proven loading efficiency. Proven loading efficiency. Proven loading efficiency.

HYDRAULIC CONTROL — ON

movement of the engine and the loader and bucket.

1000 CAPACITY — 10 tons per

hour for loading and

SAFETY AND GUARANTY — the

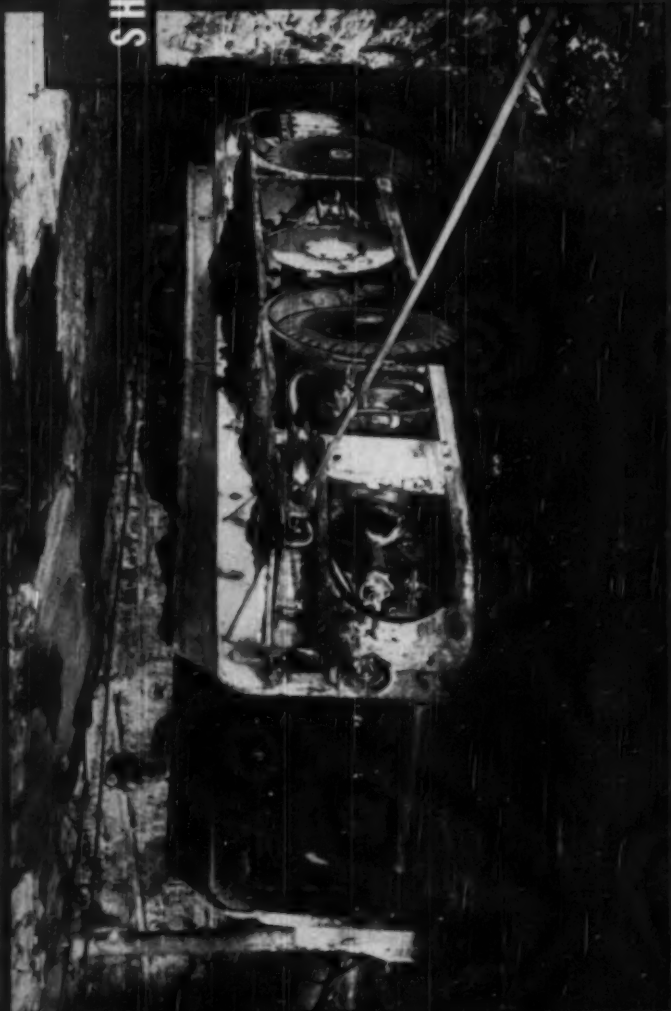
operator can stand with both feet on the floor.

LOW AND MEDIUM HEIGHT — the

660 has a 32 ft. low roof line and a 31 ft. high roof line. The 660 is higher, with greater ground clearance for both operators. Both are built to last, and to handle the toughest loads.

FOR PROOF OF ABILITY

GOODMAN SHUTTLE CARS



HALSTED ST. AT 48TH
GOODMAN
MANUFACTURING
COMPANY
CHICAGO 9, ILLINOIS

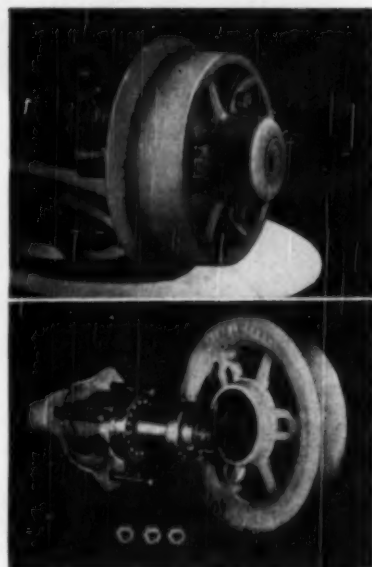
**here's why S-D "FLOATERS"
are guaranteed against
BEARING FAILURE...**



Proper bearing adjustment is automatic!

Because one of the two bearings "floats" into perfect adjustment, there are never any loose or tight bearings on S-D "Floater" Ball Bearing Wheels. That's why we can guarantee the "Floater" wheel against bearing failures for 5 years. Diagram above of a demounted "Floater" shows the heart of the wheel—that magic "floating" bearing that automatically adjusts itself when wheel is mounted and the three retaining bolts are pulled up tight. The extra large bearing absorbs all side thrusts and carries the bulk of the load. Any workman on the job can remove and replace a "Floater" Wheel because "Floater" bearings always remain in perfect adjustment on the axle whether the wheel is off or on. Remember, too, that "Floaters" have solid closed front hubs and positive back seals to keep foreign matter out and grease in! That's why so many "Floaters" often run 5 years and more on a single greasing. The S-D "Floater's" low cost of operation is certainly worth investigating. Without question, S-D "Floaters" run easier, run smoother and cost far less in maintenance than any other mine car wheel!

FOR COMPLETE INFORMATION, WRITE
SANFORD-DAY IRON WORKS, KNOXVILLE, TENN.



SANFORD - DAY IRON WORKS

For heavy-duty conveyors...

IT'S TIMKEN...



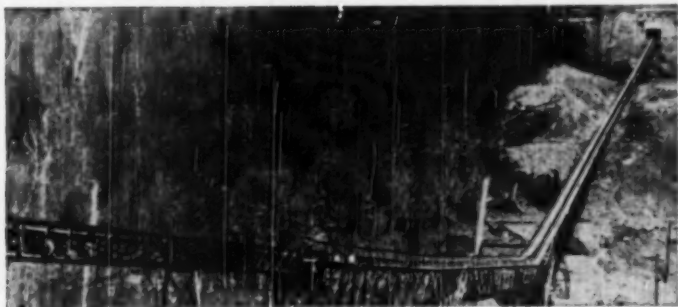
FOR over 25 years almost every heavy-duty conveyor — like most heavy duty equipment throughout industry — has relied on Timken® tapered roller bearings for long life and trouble-free performance. For example, The Blue Diamond Coal Company installed this Stephens-Adamson belt conveyor with 476 Timken bearing equipped idlers in 1930 — and at last report they haven't had to replace a bearing yet!

AND TIMKEN...



TIMKEN bearings are first choice for tough conveyor jobs like this Jeffrey Belt Conveyor installation used for long-distance sand hauling. Timken bearings provide maximum capacity for radial and thrust loads in any combination. Idlers turn freely, belt wear is reduced to a minimum. Effective seals keep lubricant in, dirt and moisture out. Lubrication and maintenance time is negligible.

AND TIMKEN® AGAIN!



AND here's one of the latest Timken-equipped jobs — a 1,485 foot Robins conveyor at The Gauley Mountain Coal Company's Williams River Mine. It's another addition to the thousands of miles of heavy-duty conveyors that roll on Timken bearings. There's no other bearing with so much to offer, no other bearing so fully proved. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

*Whenever the going's tough
industry turns to*

TIMKEN
TRADE MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



NOT JUST A BALL  NOT JUST A ROLLER  THE TIMKEN TAPERED ROLLER  BEARING TAKES RADIAL  AND THRUST  LOADS OR ANY COMBINATION 



Getting
the MOST
from your
DRILLING

?



ROCKMASTER blasting pays you MORE PROFITS PER DRILL HOLE!

The ROCKMASTER blasting system changes a lot of thinking about drilling blast-holes, because it enables the explosives in each hole to do more work! Many blasters today are saving from 20% to 40% of their former drilling costs—and saving important money on dynamite, too—since putting the ROCKMASTER system into effect in their quarries, mines or construction operations.

The ROCKMASTER system is based on split-second time intervals between blast holes, the timing being controlled within the electric detonators. You have a choice of 16 time intervals, which we help you select to fit your requirements. Explosives are chosen and loaded to fit the ROCKMASTER plan. The result: Explosives gases work behind the burden longer, stepping up blasting efficiency and accomplishing far superior breakage, combined with almost unbelievable control of throw.

In terms of drilling, this usually means that drill holes can be spaced farther apart. Or, it might mean you can use less dynamite with your regular spacing. Drilling for secondary blasting is usually cut way down, frequently eliminated altogether.

Write for booklet showing typical ROCKMASTER loading patterns for various types of blasting work. Or, better yet, call in the Atlas representative and let him tell you frankly what ROCKMASTER blasting can do for you.

Less Bark More Bite



ROCKMASTER TIMINGS

Rockmaster No.	Avg. Time of Each Delay from Zero (milli-seconds)
0 (zero)	0 (inst.)
1	8
2	25
3	50
4	75
5	100
6	125
7	150
8	175
9	200
10	250
11	300
12	350
13	400
14	450
15	500
16	550

ROCKMASTER: Reg. U. S. Pat. Off.

ATLAS

EXPLOSIVES
"Everything for Blasting"

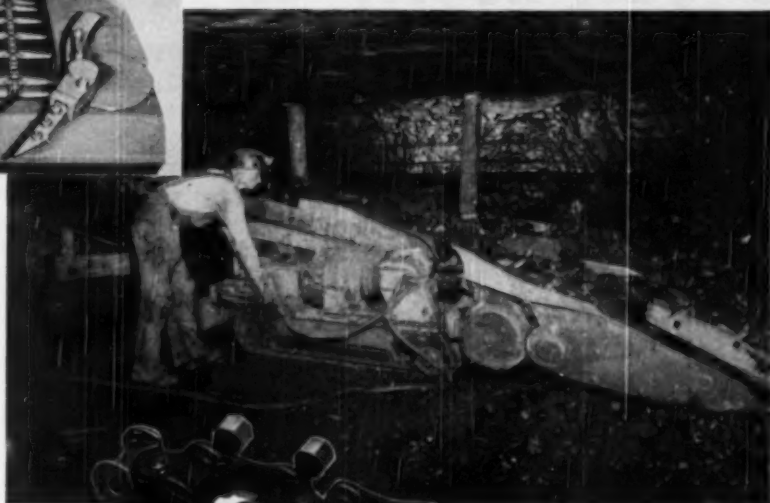
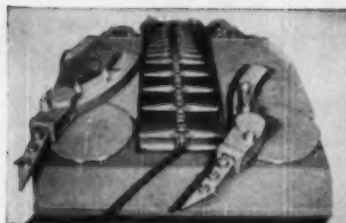


ATLAS POWDER COMPANY, Wilmington, Del. • Offices in principal cities • Cable Address—Atpowco

LINK-BELT CHAIN

Moves High Tonnage

ON JOY COAL LOADER



A Precision Made Roller Chain Especially Designed and Manufactured to Fit Rugged Mining Conditions

Eight tons of coal a minute are taken from the face, and hustled back to the waiting shuttle cars, by the Joy 14-BU Loader. The sinuous backbone of this remarkable machine is a Link-Belt roller chain with special attachments.

Severe service such as this calls for the very limit in ruggedness and durability. Link-Belt's long experience in supplying chains for power transmission and conveying, plus the world's largest chain manufacturing plant, mean complete satisfaction with chains bearing the Link-Belt symbol of quality.

In addition to conveying chains used in the mining industry, precision steel roller chains are also used for propelled drives, other miscellaneous drives and tension devices. Let a Link-Belt engineer help you with your design problems.

LINK-BELT COMPANY

Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24,
Los Angeles 33, Seattle 4, Toronto 8, Johannesburg. Offices in Principal Cities.

11,000

LINK-BELT

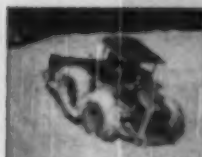


Precision Steel

ROLLER CHAINS AND SPROCKETS

At Florida Lime Pit

80 yds. hourly on 100' push



Troup Bros., Inc.

of Miami, Florida, have found a high-speed, rubber-tired C Tournadozer to be the most effective rig for stockpiling lime rock at their extensive oceanside pit. They are digging rooted coral from ground level to a depth of 8 or 10 ft. where the water line is reached . . . then rolling the loose, high-void material downhill to an extensive stockpile. It's tough going most of the time! Stone must be moved up steep grades to top of dump. Seepage pools cover portions of the work area. Short haul distances and high crusher capacity require fast continuous shuttle operation.

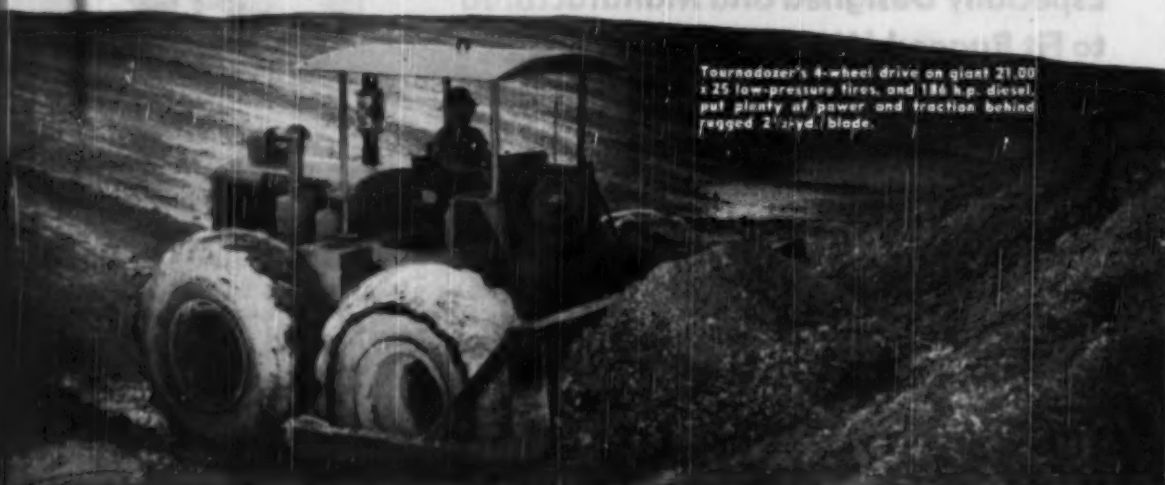
Under these conditions, Troup Bros.' Tournadozer completes a typical 200-ft. round trip every 2 to 2½ minutes . . . makes up to 24 trips an hour. Instantaneous non-stop speed selection — plus high operating speeds in both forward and reverse — enable "C" to consistently deliver 60 to 80 pay yards of pit rock hourly.

Production like this, month after month since 1948 when the Tournadozer was brought in, is the reason Company President W. J. Troup describes his mobile rig as a "heavy-duty machine". He adds, "I like the Tournadozer because of its speed and power to move material."

Ideal for clearing, hauling tasks

Tournadozer's versatility and 19 m.p.h. travel speed pay off on extra assignments for Troup Bros., too. They use their electric-control rig for clearing trees and stumps, and as a prime mover for a disc plow and brush chopper.

This same ability to handle extra jobs per year — and get extra production per hour on all of them — can increase *your* profits, too. Your local LeTourneau Distributor can show you how . . . see him for complete facts on rubber-tired Tournadozers TODAY.



Tournadozer's 4-wheel drive on giant 21.00 x 25 low-pressure tires, and 186 h.p. diesel, put plenty of power and traction behind rugged 2' x 2yd. blade.

To: R. G. LeTOURNEAU, Inc., Peoria, Illinois.

Please send information on C Tournadozer.

☐ Specifications

☐ Price

☐ Delivery

☐ Would like job analysis on present work.

Name _____

Title _____

Company _____

Type of work _____

Street _____

City, State _____

☐ Would also like information on new 122 h.p. Super D Tournadozer

Send for complete facts

ET

TOURNADOZER stockpiles



Heavy C Tournadozer digs out tough coral rock . . . difficult to move, even though previously ripped by crawler-type tractors equipped with rippers.



Big rubber tires let Tournadozer work or travel anywhere. Here, mobile "C" does stripped rock up steep grades to top of stockpile in second gear.

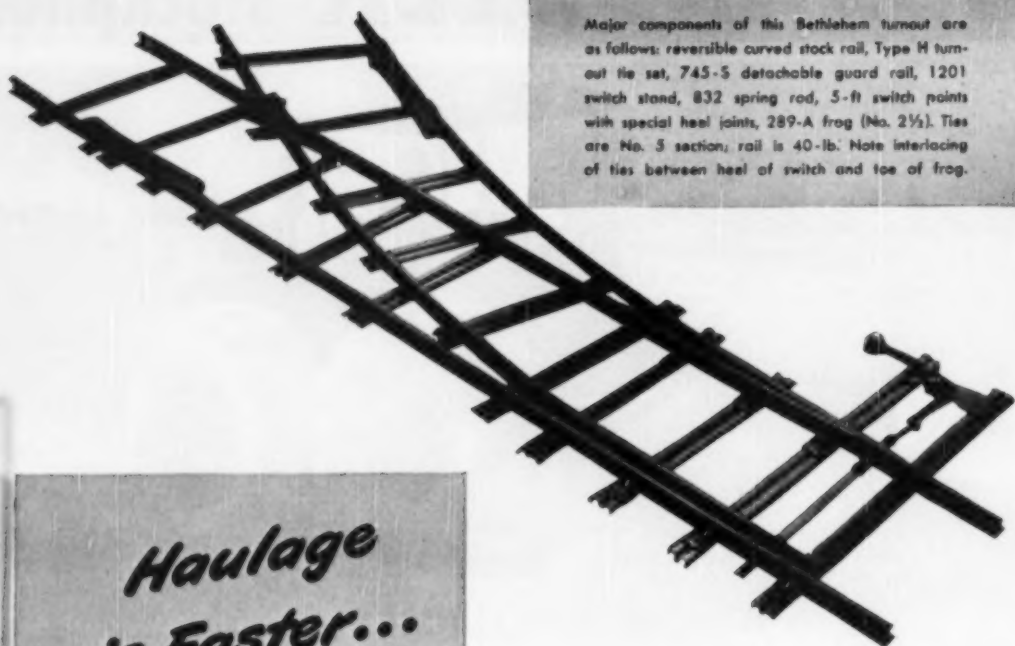
Tournadozer trademark Reg. U.S. Pat. Off. 1917

LETOURNEAU
PEORIA, ILLINOIS



TOURNADOZERS

IT'S RUBBER THAT PUTS THE ACTION IN TRACTION



Major components of this Bethlehem turnout are as follows: reversible curved stock rail, Type H turnout tie set, 745-S detachable guard rail, 1201 switch stand, 832 spring rod, 5-ft switch points with special heel joints, 289-A frog (No. 2½). Ties are No. 5 section; rail is 40-lb. Note interlacing of ties between heel of switch and toe of frog.

*Haulage
is Faster...
Safer...
Less Costly
with*
**BETHLEHEM
COMPLETE
TURNOUTS**



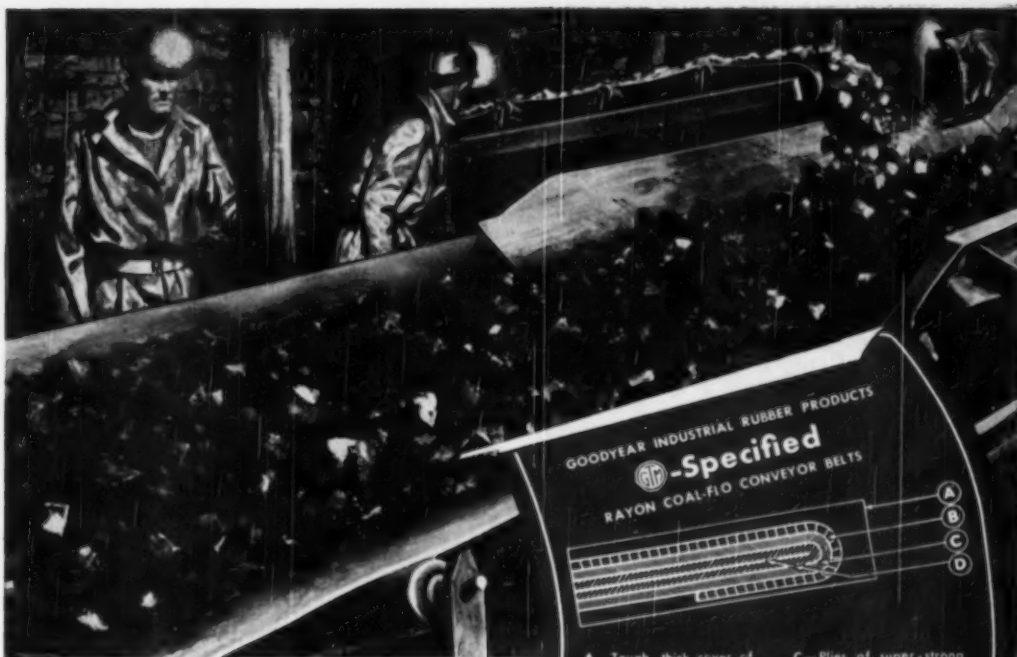
Shown here is an all-Bethlehem turnout, complete to the last bolt and nut, and with each component placed as recommended. Obviously, with turnouts like this in your system, haulage will be faster, safer, and more efficient; the track less costly to maintain.

One big reason: every integral part is specially and carefully designed for the job it has to do, and each works in complete harmony with all the other parts. Thus, in such a turnout, you have no make-shifts; no stop-gaps; nothing "home-made" or improvised that may let you down just when you need the system most.

Another fine feature of Bethlehem turnouts is their reversibility. This is due largely to two factors — the reversible curved stock rail and a specially-punched tie for the number two position under the switch points. Thus the same turnout can be assembled right-hand or left-hand, with the 1201 or 1217 switch stand placed on either side.

A complete turnout supplied by Bethlehem is easily and quickly installed; assembly requires no special skill or training. Why not investigate? There's money to be saved by using this up-to-the-minute trackage — not to mention the time gained and the overall improvement in haulage.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



Coal rides on Rayon

farther, longer, at lower cost

Now you can obtain Goodyear's famous Coal-Flo conveyor belts in two "tailored-to-the-job" constructions—one bodied with conventional fabric, the other with super-strong rayon. Proved by three years' service in West Virginia coal mines, the new rayon-bodied Coal-Flo gives you these outstanding advantages:

Greater strength—less weight. A Goodyear rayon-bodied belt with

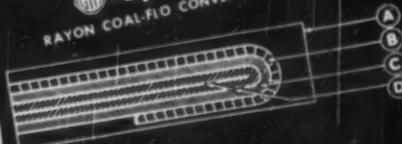
32-oz. fabric has 76% greater tensile strength than one built with the same weight of conventional fabric, even excels 42- and 48-oz. ducks. A 30-inch, 4-ply, 32-oz. rayon belt weighs about 1,200 pounds less per 1,000 feet compared with a standard 42-oz. belt.

On-the-job advantages. Rayon Coal-Flo belts can be operated over longer centers at higher tensions—

reduce number of transfer points. Lighter weight means easier handling, less power consumption. Thinner belts have less outer-ply stresses, reducing danger of breaks. Belts are more flexible, trough better.

Ask the G.T.M. for the facts on rayon Coal-Flo belts—and COM-PASS belts for longer runs and high-lift slopes.

GOODYEAR INDUSTRIAL RUBBER PRODUCTS
-Specified
RAYON COAL-FLO CONVEYOR BELTS



A—Tough, thick cover of acid-resistant rubber
B—Sturdy horseshoe breaker protects ply edges from fraying and wicking acidic moisture

C—Plies of super-strong rayon fabric
D—Rubber skim-coat between plies increases flex life

TO CONSULT THE G.T.M. about hose, flat belts, V-belts, molded goods, packing, tank lining, phone your nearest Goodyear Industrial Rubber Products Distributor, or write Goodyear, Akron 16, Ohio.

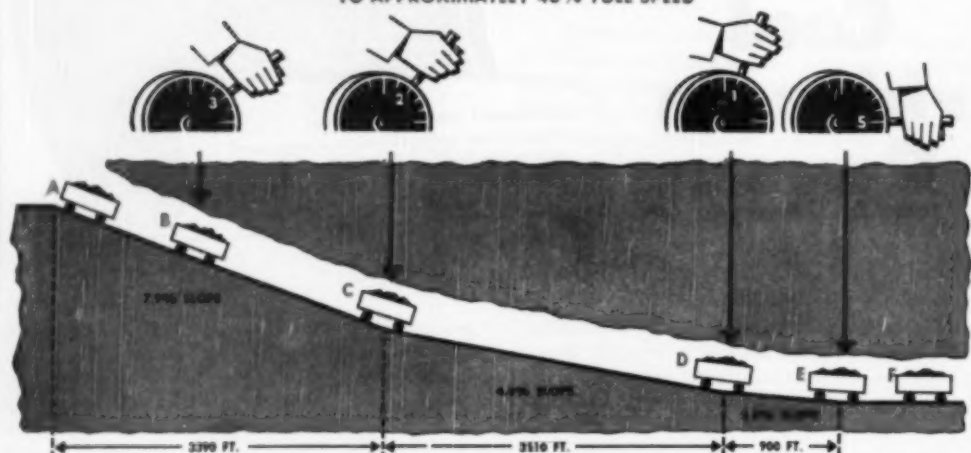
GOOD YEAR

THE GREATEST NAME IN RUBBER

Coal-Flo, Compas-T.M.'s
The Goodyear Tire & Rubber Company

Cut brake wear! *Save spotting time!* *Promote safe lowering!*

HOW DYNAMIC BRAKING HOLDS THIS UNBALANCED SLOPE HOIST TO APPROXIMATELY 40% FULL SPEED



A At start, car is lowered by gravity and allowed to accelerate to 40% full speed.

B Dynamic braking is then applied in order to prevent speed increase.

C Because of slope change, only approximately 23% braking torque is required to hold speed.

D Electric braking is further decreased to about 13% to correspond with reduced pitch of track.

E At bottom, 100% braking torque is applied to decelerate to low speed for spotting.

F Mechanical brakes are applied only at end of trip to spot and hold cars.

To provide allowable man-trip speed while lowering, 40% of the full rated speed of 1200 fpm is desired over the 7800-foot length of travel. Using dynamic braking to obtain this

desired speed, the operator watches his electric rope-speed indicator and simply moves his master switch to the points of braking required. Thus the speed is held in good control.

GENERAL  ELECTRIC

General Electric a-c mine-hoist drive in this unbalanced-slope installation uses d-c dynamic braking control to give these advantages in reduced-speed lowering

To increase hauling capacity, the operators of a West-Central Pennsylvania mine recently installed a co-ordinated General Electric a-c mine-hoist drive. Replacing a smaller one, the new drive has boosted payload capacity to 95 tons per trip—330 tons per hour!

But that's not all! Use of d-c dynamic braking to control the hoist motor during reduced-speed lowering also provides these advantages:

Safety promoted! Lowering man-and-material trips are made at safe, uniform speeds, without jerking.

Maintenance costs cut! Mechanical brakes are used only to hold trip at its destination and for final stopping after retarding to low speed with dynamic braking—thus lessening strain and wear on brake wheels and linings.

Spotting time reduced! Control of low-speed lowering permits spotting, landing, and dropping trips into partings with minimum delay.

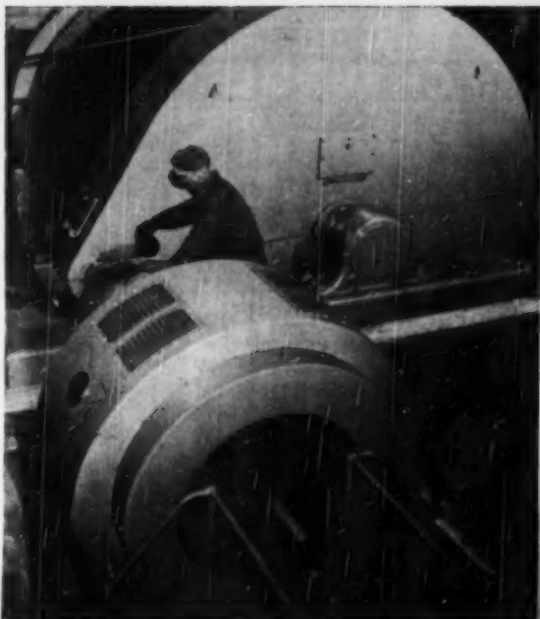
Economy! Simplicity! Reliability!

G-E induction-motor mine-hoist drives combine the advantages of low first cost and upkeep, simple installation and operation, high efficiency, and rugged reliability. That's why over 800 are now in service, helping to step up mine production and cut hoisting costs.

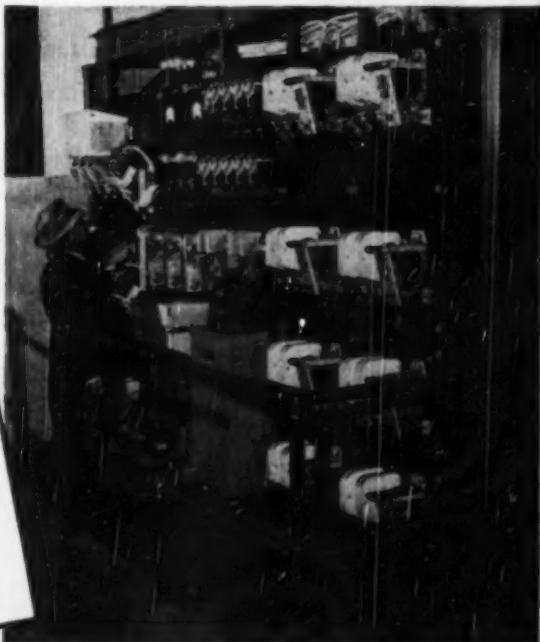
For experienced help on mine-hoist drives and other electric equipment to cut mining costs, it will pay you to call in a G-E mining specialist. Phone him at your nearest G-E office. *Apparatus Dept., General Electric Co., Schenectady 5, N. Y.*



Mine-Hoist Drives
...to cut mining costs!



Typical of hundreds of others is the G-E 800-hp wound-rotor induction motor geared to the hoist at this mine. In ratings from 50 to 3500 hp, these motors offer the simplest way to obtain the advantages of electric drive for mine hoists.



G-E control and protective equipment, located in the hoist house conveniently near motor and drum, provides full magnetic reversing d-c dynamic braking control of the hoist motor and protection of machines and power system.



ADVANCE-DESIGN TRUCKS

POPULARITY LEADERS Chevrolet trucks are the favorites by far! In every postwar year truck users have bought more Chevrolets than any other make. And that's proof of the owner satisfaction they have earned!

PERFORMANCE LEADERS Chevrolet trucks give you high pulling power over a wide range of usable road speeds . . . cut down total trip time with high acceleration on the straightaway.

PAYLOAD LEADERS Careful design and rugged construction permit you to haul more goods more miles—at lower cost per ton mile! You enjoy real savings on operating and repair costs.

PRICE LEADERS You're money ahead with Chevrolet trucks! Chevrolet's rock-bottom initial cost—outstandingly low cost of operation and upkeep—high-trade-in value, all add up to the lowest price for you.

Packed with **VALUE . . .** Primed with **POWER**

Chevrolet Advance-Design trucks have everything it takes—and plenty to spare. Rugged construction to withstand the wear and tear. Handling ease and comfort to lighten the load of a day's work. And more power than ever! Two great Valve-in-Head engines—the Loadmaster 105 h.p. and the Thriftmaster 92 h.p.—make these the most powerful trucks Chevrolet has built! Yes, these new jobs bring you peak value—and at a low price. They cost surprisingly little to buy, to run and maintain. That's why Chevrolet trucks outsell them all!

CHEVROLET MOTOR DIVISION, General Motors Corporation, DETROIT 2, MICH.

AHEAD WITH ALL THESE PLUS VALUES

• **TWO GREAT VALVE-IN-HEAD ENGINES:** the New 105-h.p. Loadmaster and the Improved 92-h.p. Thriftmaster—to give you greater power per gallon, lower cost per load • **THE NEW POWER-JET CARBURETOR:** smoother, quicker acceleration response • **DIAPHRAGM SPRING CLUTCH** for easy action engagement • **SYNCHROMESH TRANSMISSIONS** for fast, smooth shifting • **HYPOID REAR AXLES**—5 times more durable than spiral bevel type • **DOUBLE-ARTICULATED BRAKES**—for complete driver control • **WIDE-BASE WHEELS** for increased tire mileage • **ADVANCE-DESIGN STYLING** with the "Cab that Breathes" • **BALL-TYPE STEERING** for easier handling • **UNIT-DESIGN BODIES**—precision built.





General view of the Jeffrey Roof Drill showing the drill arm assembly.

New JEFFREY 56-RD ROOF DRILL

(Patent Pending)

SPEEDS UP ROOF-BOLTING OPERATIONS

● The New Jeffrey 56-RD Roof Drill features a specially-designed Arm, hydraulically operated and mounted on either a self-propelled track type or rubber tired truck . . . provides a reach of 10' 10½" each side of center line of machine.

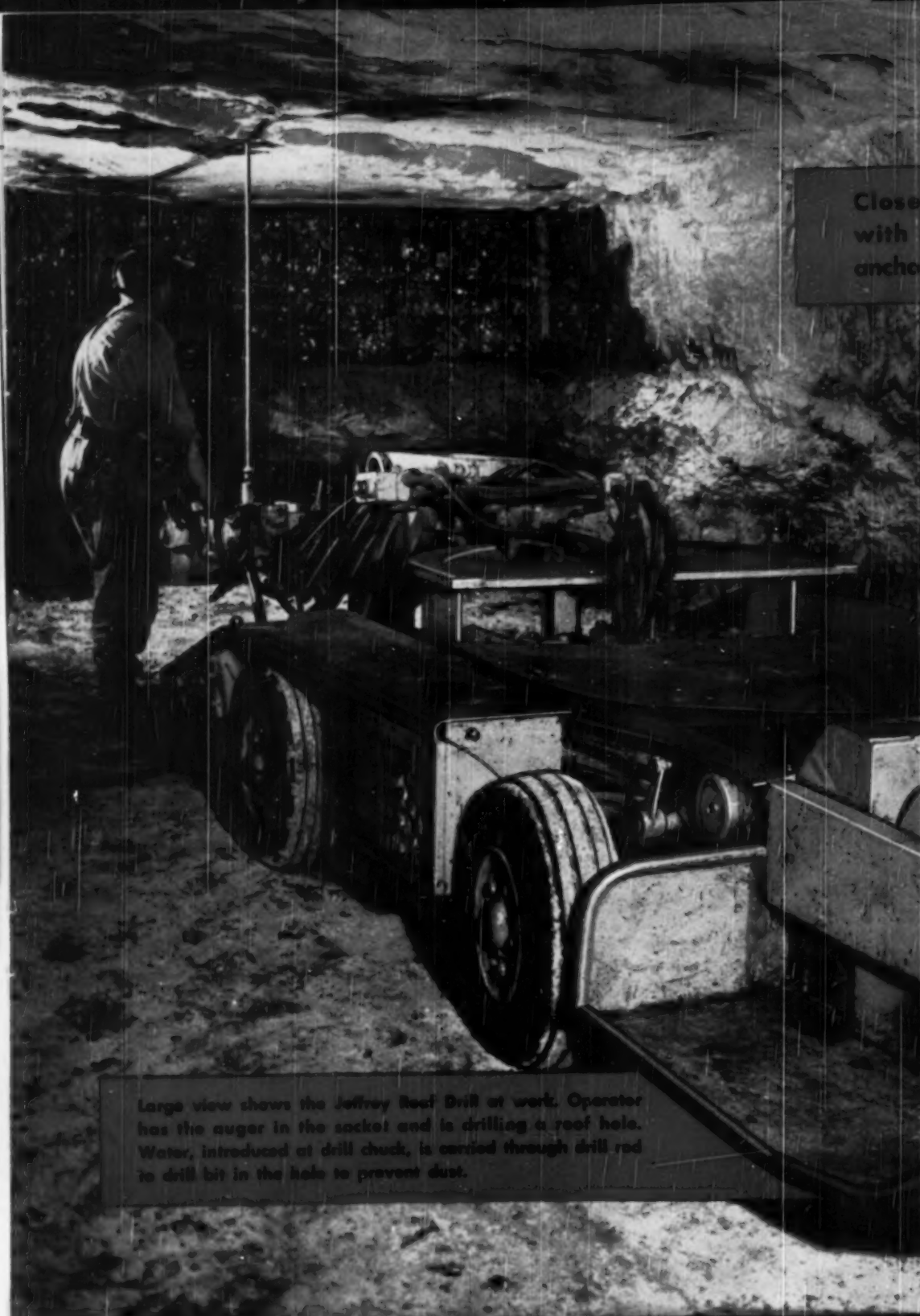
Straight-line feed for the auger and parallelism to its starting position are maintained by means of cams which shorten and lengthen the Drill Arm and make the necessary angular adjustments as Drill is fed upward.

The drill head includes an impact wrench (see inset on center spread) for anchoring and tightening the bolts.

If you want to cut costs in Roof Drilling, give our engineers a chance to explain the Jeffrey Roof Drill in detail. Write today.



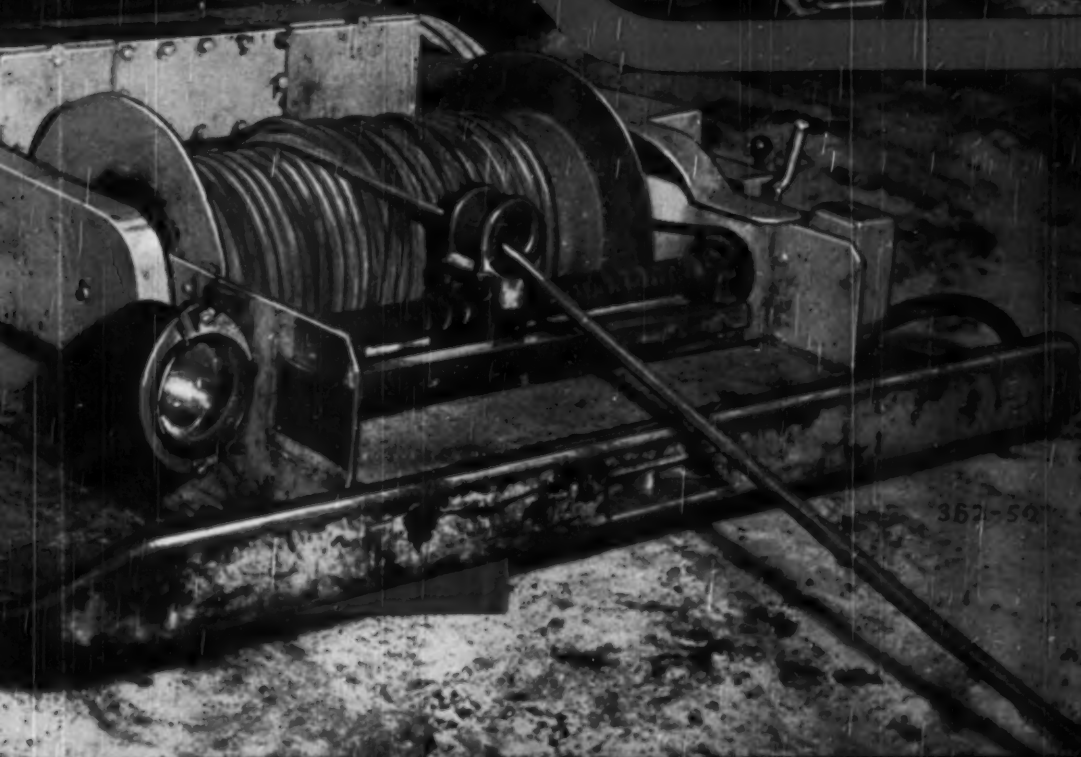
Close-up view of the Arm showing drill head and the hydraulic controls for raising, lowering and swinging arm.



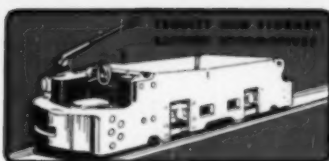
Clos
with
anch

Large view shows the Jeffrey Roof Drill at work. Operator has the auger in the socket and is drilling a roof hole. Water, introduced at drill chuck, is carried through drill rod to drill bit in the hole to prevent dust.

Close-up of the same machine
with impact wrench in use for
anchoring and tightening of bolts.



357-50



JEFFREY

EQUIPMENT

FOR COAL MINES

THE JEFFREY MANUFACTURING COMPANY

Established 1877

General and Export Sales Offices

COLUMBUS 16, OHIO, U. S. A.

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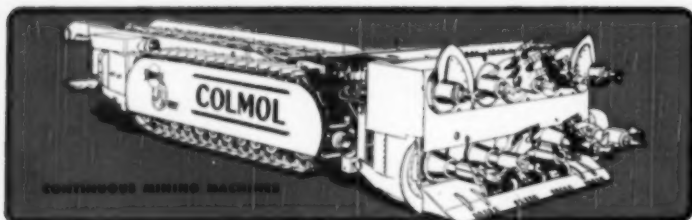
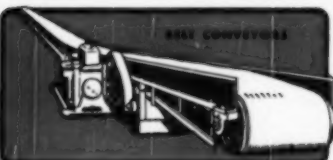
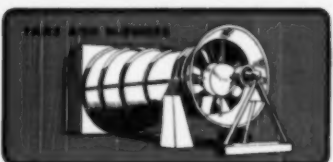
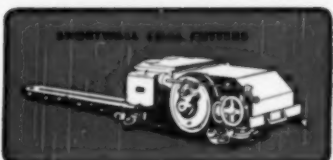
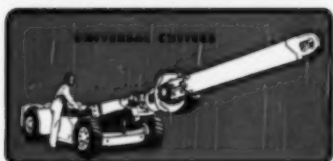
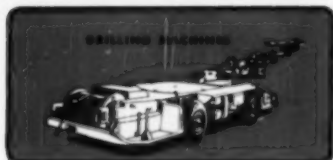
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FOREIGN PLANTS

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CONTINUOUS MINING MACHINE



"WE GOT MIGHTY TIRED SITTING UP NIGHTS WITH SICK BELTING

Then we tried the Thermoid treatment!
Now we're sitting pretty!"



"Here at the Quarry we operate 9 hours a day, 6 days a week. Our conveyor belting on flight No. 1—where the belting really takes a beating from big, jagged, saw-toothed rocks—was giving us plenty of trouble.



"Because of our long work-week, the men began grumbling about having to put in so much extra time late at night repairing rips and tears in this beat-up belting.



"So we called up our belting distributor and he brought a Thermoid engineer around. 'What you need,' said the engineer, 'is Thermoid "H.T." belting with a special soft rubber ply that will cushion those rocks like a cradle.'



"That was several months ago. Now, after watching that Thermoid 'H.T.' belting take the most savage pounding imaginable, we know it is a quality product that can be depended on to stand up under plenty of slam-bang punishment.



"If you have a belting problem, Mister, why not get in touch with your Thermoid distributor. Whether your problem is run-of-mill or highly specialized, he'll help you solve it—efficiently and economically."

A Complete Line of Quality Rubber Products For All Industrial Needs

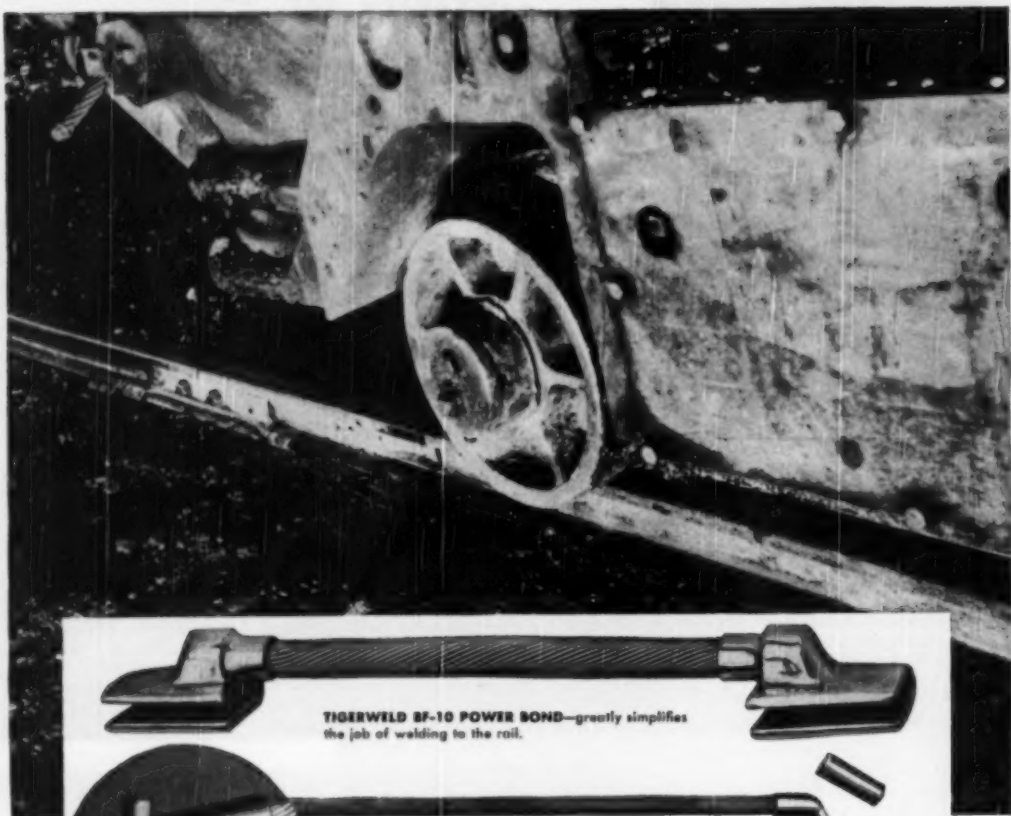
In addition to Conveyor Belting, Thermoid makes Transmission Belting, F.H.P. and Multiple V-Belts, Elevator Belting, and a complete line of Wrapped and Molded Hose, Industrial Brake Linings and Friction Materials.

It will pay you to
Specify Thermoid!

**Thermoid
Company**

Main Offices and Factory • Trenton, N. J., U. S. A.
Western Offices and Factory • Nephi, Utah, U. S. A.
Industrial Rubber Products • Friction Materials • Oil Field Products

Self-clamping U-S-S American Rail Bond goes on easy... withstands constant vibration



TIGERWELD BF-10 POWER BOND—greatly simplifies the job of welding to the rail.



U-S-S AMERICAN WEDGE TYPE BOND—offers the easiest installation—yet holds with a tight grip. A hammer is the only tool required for installation of these bonds.

● The U-S-S American BF-10 Rail Bond is made to go on easy—and stay put. The self-clamping terminal secures to rail base with a few hammer blows. It stays in position, so it's easy to weld. Every strand of the heavy cable is butt-welded to the terminal to make a positive, vibration-proof joint.

The American Wedge Type Bond is particularly suited for temporary trackage. All you need to install it is a high-speed drill and a 3 lb. hammer. Three sharp blows—and it's on. Despite this very easy installation, the Wedge Type Bond holds so tight that many mines use it for permanent installations.

Write today for more information on the complete line of U-S-S American Rail Bonds.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES, CLEVELAND, OHIO

COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS

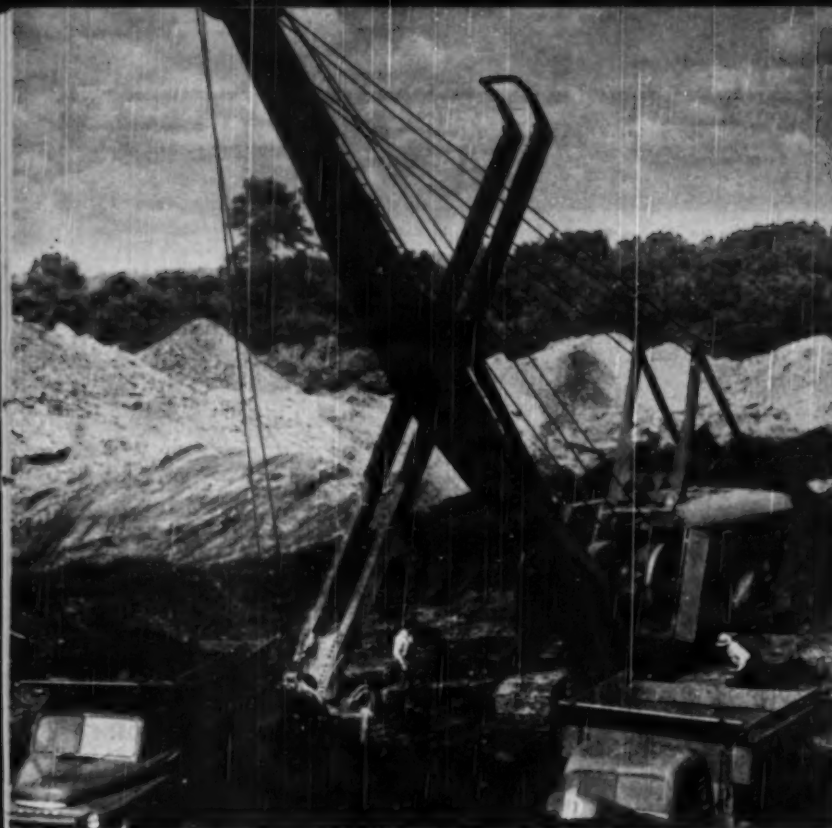
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS

UNITED STATES STEEL EXPORT COMPANY, NEW YORK



American Tigerweld Rail Bonds

UNITED STATES STEEL



Stops throw-off on dipperstick gears!

LUBRICANT throw-off from dipperstick gears on the shovel shown above brought trouble and expense to the Landrey Mining Company of Winslow, Indiana. The gears had to be greased once or twice each shift. This took time and labor, consumed lubricant by the pound.

A Standard Oil lubrication specialist persuaded company officials to try one of the Calumet Viscous Lubricants—No. 10X.

The results are reported by Ralph A. Landrey, president of the company. "After the first application, no additional lubrication was needed after one full week of operation. However, we added some lubricant because it seemed impossible that there could be any left on the gears. At the present time, we add Calumet Viscous Lubricant No. 10X about every three weeks. We have not only extended

gear life but have made a considerable saving in the amount of lubricant and in the labor required for application."

Savings such as these have been brought to a host of midwest mines by Standard Oil's lubrication engineering service and high-quality products. How these service and product advantages can help you is explained at the right.

**CALUMET
VISCIOUS
LUBRICANTS**

What's YOUR problem?



Oscar Doussman, lubrication specialist at Standard Oil's Evansville, Indiana, office solved the Landrey Mining Company's problem because he was thoroughly familiar both with the qualifications of his products and with the requirements of the job. He applied the lubricant that exactly met the customer's needs.

There is a corps of such lubrication specialists throughout the Midwest who are trained and experienced to help mine and plant operators solve similar problems. Experience enables these men to find quickly the cause of lubricating trouble. Knowledge of petroleum products enables them to prescribe the lubricant needed. There is one of these lubrication specialists at the Standard Oil Company (Indiana) office near you. He is there to serve you. A call or card will put him at your service.

Investigate the cost-cutting possibilities of these lubricants

STANOIL INDUSTRIAL OILS

Here's one line of oils that provides cleaner operation of loader and crane hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

SUPERLA MINE LUBRICANTS

This new, improved line of oils and greases provides better lubrication of cutters, loaders, locomotives, mine cars, and other underground equipment. They eliminate transmission-case deposits, reduce clutch-plate gumming, and minimize wear on gears and bearings.

CALUMET VISCIOUS LUBRICANTS

On open gears and wire rope, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

STANDARD OIL COMPANY (INDIANA)





BOWDIL PRODUCTS

HELP YOU GET MORE \$\$\$ FROM THAT MINE OF YOURS

NEW TELESCOPING TRANSIT SUPPORT

For use in all types deep mining, especially efficient for conveyor mining. As rigid as a prop, sturdily constructed of aluminum and stainless steel. Lightweight, easily, quickly sets up correct height for transit. Main column graduated on 2 sides in 1/100 foot.

Three standard lengths telescoping from 3 to 5 ft., 5 to 8 ft., and 8 to 12 ft. in height. Special lengths furnished on request.



BOWDIL CUTTER BAR

Bowdil Cutter Bars are designed for extra strength and power saving. Rivet-free body, Z bar construction, wide wearing strips make it the sturdiest bar in mining. Bowdil Bars are standardized to fit all coal mining machines.



FABRI-FORGE CHAIN

Lower your operating costs with Bowdil Fabri-Forged Chain. Rugged, easy to maintain, the drop-forged lug body stands up under heavy wear with breakage practically eliminated. A major improvement is the true-running radial track guide.



BOWDIL FAST ROPE SOCKET

You can save time with the Bowdil Rope Socket . . . takes just two minutes to install. No tools necessary. High tensile-strength steel and patented design give maximum strength.

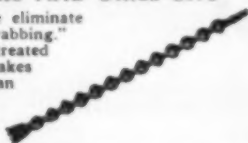


REPLACEABLE POINT MINER'S PICK

With a Bowdil Miner's pick, it only takes a few seconds to replace a dull, blunted point with a sharp one. Light or heavy, Bowdil pick heads are perfectly designed for weight and balance, come with or without wood handle.

ALLOY STEEL AUGERS AND DRILL BITS

Uniform temper and shape eliminate almost all possibility of "grabbing." The use of special heat-treated alloy steels not only makes them last longer, but adds an important safety factor.



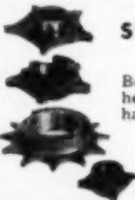
BOWDIL DRILL BITS

Any bit requirements can be met from Bowdil's complete line. Fish-tail auger bits, four-point auger bits and two-point clay bits are available in a number of different sizes . . . all made from Bowdil's specially treated steel for long and efficient service.



DETACHABLE JAW SPIKE PULLER

Small, easy to handle . . . pays for itself many times over. Detachable jaws make it possible to replace claws without delay. The special construction pulls spikes without bending them.



SPROCKETS FOR ALL MINING MACHINES

Bowdil Sprockets are made from special heat-treated alloy steel and designed for hard wear. Our stock of over 100 different styles includes clutch, spline and keyed types—various tooth designs of 4 to 13 teeth.

WANT SOMETHING SPECIAL? BOWDIL CAN BUILD IT

Bowdil has the staff and facilities to work with you on any custom building or rebuilding, engineering, machining, fabricating. Excellent heat-treat equipment. If you have a problem, bring it to Bowdil.



BATTERY OPERATED MINE LOCOMOTIVE
DESIGNED AND BUILT BY BOWDIL

SALES AGENTS
FOR
The Cincinnati
ELECTRIC
DRILL

BOWDIL
COAL CUTTING EQUIPMENT
CANTON OHIO

SALES ENGINEERS IN—Whitesburg, Kentucky—West Frankfort, Illinois
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Danville, West Virginia—Canton, Ohio—Birmingham, Alabama
Helper, Utah—Kansas City, Missouri—Centerville, Iowa—Topeka, Kansas
New Castle, England—Alberta, Canada



"Double-Feature" Protection FOR SHUTTLE CAR OPERATION

RIBBED INSULATED CONDUCTORS

A radical improvement in shuttle car cable design wherein the insulated conductors are ribbed, or gear-shaped, in order to firmly interlock with the jacket. They will not twist, kink, or override each other in normal service. Even continual twisting of the cable finds it well nigh impossible to pull them out of position.

CURED-IN-LEAD SELENIUM NEOPRENE ARMOR

Can't be beat for the protection it provides against crushing and runovers, and for its balanced resistance to water, acids, grease, oil, heat and flame. Bears approval No. P-101 of the Pennsylvania Department of Mines.

These two big features of Simplex-TIREX Shuttle Car Cables give you reliable assurance of lower-cost, more productive shuttle car operation, regardless of service conditions. Providing a potent 1-2 punch that effectively offsets both natural and mechanical hazards they add to cable life, resulting in less-frequent cable replacements, less down time per shuttle car, and, consequently, more tonnage per cable.

Only TIREX Shuttle Car Cables provide this valuable combination. They are available in either Type W or Type G constructions. Our new catalog, "Simplex Cables For Mining" gives complete information. Return the coupon below for your copy.

SIMPLEX

WIRE AND CABLE CO.

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79 SIDNEY ST., CAMBRIDGE 39, MASS.	
GENTLEMEN: PLEASE SEND CATALOG 1008 TO:	
NAME _____	TITLE _____
COMPANY _____	
STREET _____	
CITY _____	STATE _____



Profits of Bagdad Copper Corporation's isolated Arizona plant depended on maintaining economical and trouble-free operation. They chose the Gates Vulco Rope Drives (shown) for these big ball mills because of their proven ability to handle this rugged service. Also, because the failure of one belt would not necessitate a shutdown, but would give ample notice when a replacement set of belts was needed.

Let this simple test tell you exactly **WHY** the Concave Side cuts your V-Belt costs

To see for yourself the belt-saving importance of the Concave Side, just pick up *any* V-belt and bend it as it bends when it goes around a pulley.

As the belt bends, grip its *sides* firmly with your fingers. You will feel the sides of the belt *change shape*. This is because the top of the belt is under tension and, hence, grows *narrower* while the body, under compression, *bulges out*. (See figure 1 and 1-A)

Now look at figures 2 and 2-A. There you see how the bending changes the shape of the belt that is built with the Concave Side—The Gates Vulco Rope. The concave sides of this belt merely *fill out* and become perfectly *straight*. There is no side-bulge. This belt, when bent, *precisely fits its sheave groove*.

A very distinct saving in belt wear results. No side-bulge means that the sides press *evenly* against the V pulley and therefore wear *uniformly*—resulting in longer life for the sidewall and, naturally, *longer life for the belt!*

If you care about cutting your belt costs, it will pay you to make sure, whenever you buy V-Belts, that you get the V-Belt with the Concave Sides...the Gates Vulco Rope!

What Happens When a V-Belt Bends

Straight-Sided V-Belt



Fig. 1

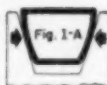


Fig. 1-A

How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear at Point Shown by Arrows.

Gates Vulco Rope with Concave Side



Fig. 2

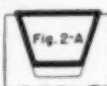


Fig. 2-A

The Concave Side Fills Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

CS-508

THE GATES RUBBER COMPANY
DENVER, U.S.A.

World's Largest Makers of V-Belts

GATES VULCO ROPE DRIVES
Engineering Offices and Jobber Stocks
IN ALL INDUSTRIAL CENTERS
of the U.S. and 71 Foreign Countries



the **ONE-TWO** for maintenance costs

1 Gulf Mining Machine Lubricant

2 One of Gulf's Quality Hydraulic Oils



With Gulf Mining Machine Lubricant and one of Gulf's Quality Hydraulic Oils you can service almost any mining machine—and you eliminate as many as 3 oils and greases! Thus your lubricant storage and handling are greatly simplified and you avoid application errors at the face.

Just these two Gulf Quality Lubricants not only do the job of several other oils and greases, but do it better! Gulf Mining Machine Lubricant has a heavy body to insure less leakage from gear cases; exceptional adhesiveness that prevents throwoff or channeling; higher lubricating value that insures less wear; and it resists the washing action of water.

The proper Gulf Hydraulic Oil gives outstanding protection to each hydraulic pump—helps maintain system efficiency!

Call in a Gulf Lubricating Engineer today and ask him to explain in detail how these Gulf quality products for cutting and loading machines can give you effective help in your efforts to increase tonnage and reduce costs. Write, wire, or phone your nearest Gulf office.

Gulf Oil Corporation • Gulf Refining Company

GULF BUILDING, PITTSBURGH, PA.

Sales Offices - Warehouses

Located in principal cities and towns throughout Gulf's marketing territory





SEE this pump in operation plus the new *Electrifugal* pump, transformer with transparent shell and many other A-C products at the Southern Appalachian Industrial Exposition in Bluefield, West Virginia, August 16 to 19.

This Pump Keeps Your Coal Washing Costs Low

THE ALLIS-CHALMERS CW PUMP is especially designed to stand up under the rough service of pumping slurries in coal washing operations. Hundreds of installations in coal preparation plants like the one above have proved the CW's ability to deliver really low cost performance.

Low Operating Cost

All wearing parts of the CW are made of *Allisite*, a high nickel iron alloyed for maximum abrasion resistance. All parts are of extra heavy construction. And every application is engineered by a specialist who knows coal washing problems and how to solve them. The result is long life under the severest operating conditions.

Low Maintenance Cost

Eventually every coal washing pump needs service. Service on the CW is quick and easy. Parts are simple and easy to handle. The CW can be torn down, a part replaced and back in action again in *less than a half hour*. Piping need not be disturbed unless casing is replaced.

Head and capacity can be changed instantly when the CW is equipped with *Texrope* V-belt drive and *Vari-Pitch* Auto-

matic sheave. Standardized parts interchangeable between various sizes of pumps reduce spare parts inventory.

Get the Complete Story

Your nearest A-C representative will be glad to give you complete facts and figures on CW performance. Call him or write for Bulletin 08B6381.

A-3127

ALLIS-CHALMERS, 968A SO. 70 ST.

MILWAUKEE, WIS.



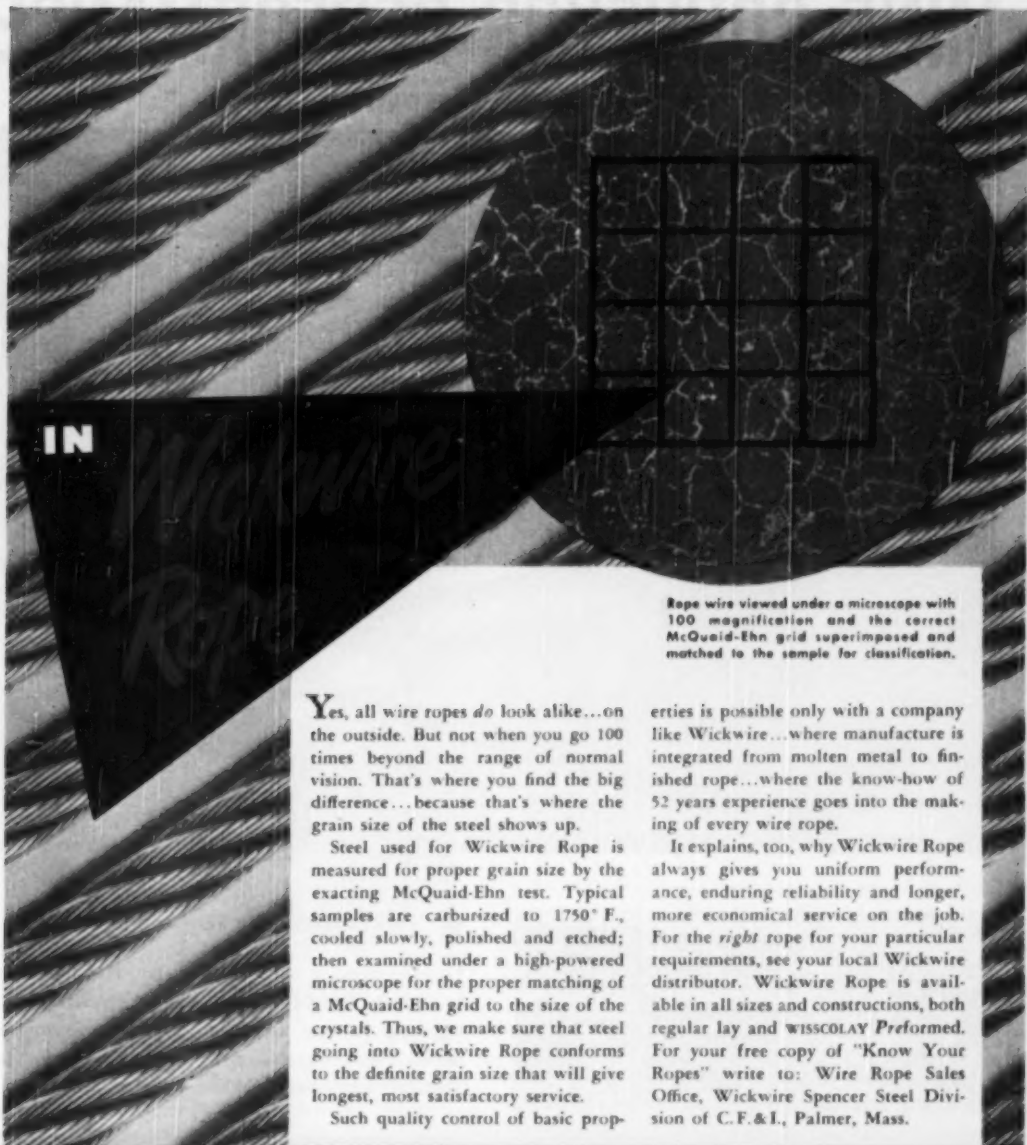
ONLY FIVE WEARING PARTS

Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace.



ALLIS-CHALMERS

ALL ROPES look ALIKE... but THERE'S MORE THAN MEETS THE EYE...



Rope wire viewed under a microscope with 100 magnification and the correct McQuaid-Ehn grid superimposed and matched to the sample for classification.

Yes, all wire ropes *do* look alike...on the outside. But not when you go 100 times beyond the range of normal vision. That's where you find the big difference...because that's where the grain size of the steel shows up.

Steel used for Wickwire Rope is measured for proper grain size by the exacting McQuaid-Ehn test. Typical samples are carburized to 1750° F., cooled slowly, polished and etched; then examined under a high-powered microscope for the proper matching of a McQuaid-Ehn grid to the size of the crystals. Thus, we make sure that steel going into Wickwire Rope conforms to the definite grain size that will give longest, most satisfactory service.

Such quality control of basic prop-

erties is possible only with a company like Wickwire...where manufacture is integrated from molten metal to finished rope...where the know-how of 52 years experience goes into the making of every wire rope.

It explains, too, why Wickwire Rope always gives you uniform performance, enduring reliability and longer, more economical service on the job. For the *right* rope for your particular requirements, see your local Wickwire distributor. Wickwire Rope is available in all sizes and constructions, both regular lay and *WISCOLAY Preformed*. For your free copy of "Know Your Ropes" write to: Wire Rope Sales Office, Wickwire Spencer Steel Division of C.F.&I., Palmer, Mass.

WICKWIRE ROPE

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

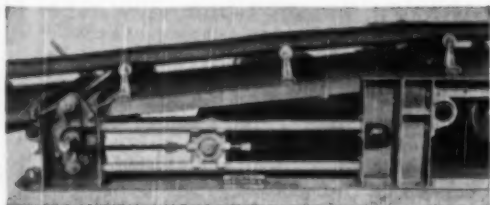
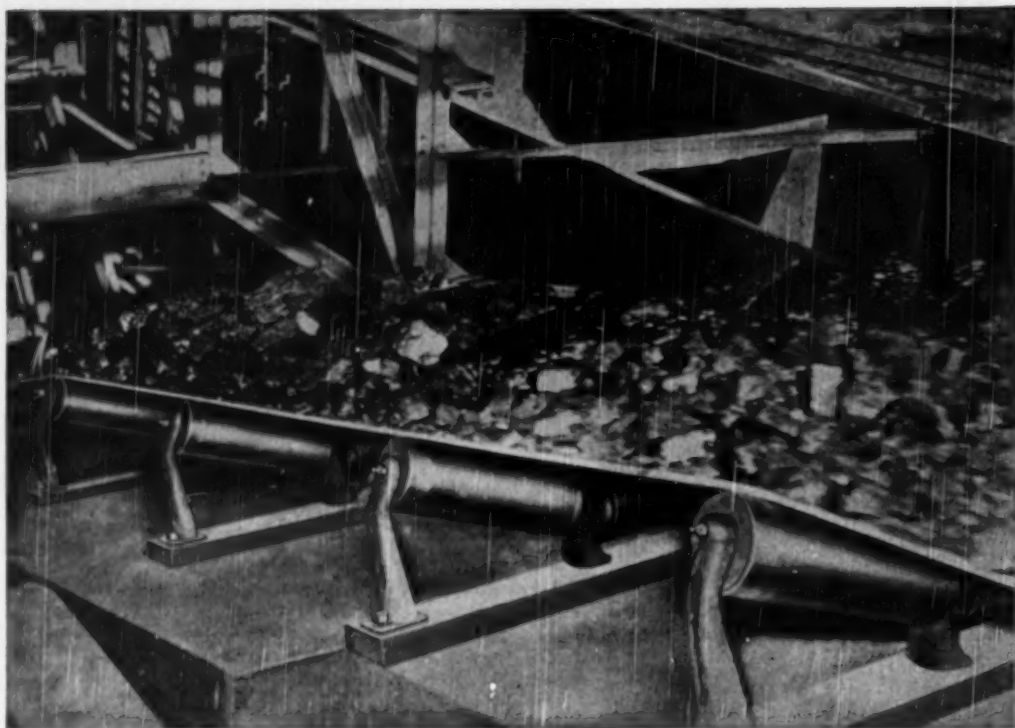
WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass.

EXECUTIVE OFFICE—500 Fifth Avenue, New York 18, N. Y.

SALES OFFICES—Abilene (Tex.)•Boston•Buffalo•Chattanooga•Chicago•Denver•Detroit•Emlenton (Pa.)•Philadelphia•Tulsa•Fort Worth•Houston•New York
PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corporation, Oakland 6, California



ONLY ONE FIRM TAKES FULL MINE CONVEYOR PERFORMANCE



◀ INTERNAL TAKEUP

Located directly back of the drive. Handles 10' of belt slack. Operated by reversible ratchet-wrench working on gear reduction to minimize manual effort. Double-acting pawl prevents backing-up. Worked from either side of conveyor.

TAIL SECTION ▶

Telescopic type to provide tail takeup action. Easy to clean out—no steel work under tail pulley. Has transverse cover to protect pulley, bearings and belt. Strong enough so you can rest a feeder on it.



RESPONSIBILITY FOR COMPLETE

... only **HEWITT-ROBINS** makes and guarantees
both machinery and belt

No longer need you worry about your Mine Conveyor operation—wondering who will be responsible for the successful, *lasting* performance of its machinery *and* belt.

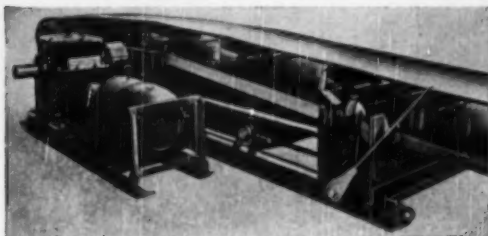
Get your Mine Conveyor from Hewitt-Robins. Here is a company—the only company in all the world—able *and* willing to take complete *unified* responsibility for the installation. For only Hewitt-Robins makes both machinery *and* belt.

The machinery is the sturdy, strong, substantial construction made by the Robins Conveyors Division and installed in all the better mines. The belt is the long-wearing Ajax® Underground Belt—with mildew inhibitors and acid neutralizers compounded in its wear-resisting rubber covers and high tensile fabrics in its enduring carcass—made by the Hewitt Rubber Division.

Yes, when you buy a Hewitt-Robins Mine Conveyor you get not only the best elements

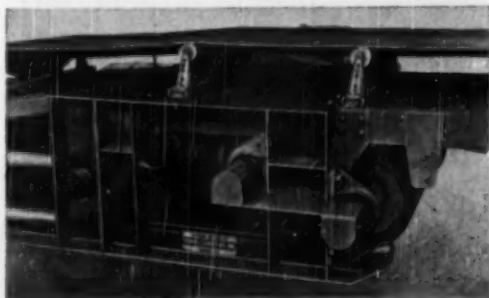
—machinery and belt—that your money can buy; you also get the satisfaction and peace of mind that come from having one unified source guaranteeing successful performance.

Hewitt-Robins Mine Conveyors can be shipped complete—machinery, belt, motors, reducers and drives—out of stock from Passaic, N. J., and Charleston, W. Va., in belt widths 26", 30" and 36", any desired length. For immediate delivery, get in touch with Hewitt-Robins, Inc., 1010 Pennsylvania Ave., Charleston, W. Va., or 270 Passaic Ave., Passaic, N. J.



➤ **UNIFIED DRIVE SECTION**

Motor, reducer and controls mounted on a single base—skid-designed for easy moving about. Can be located on either side of the conveyor. Drive reversible—incoming for men and material, outgoing for high output of product.



➤ **SINGLE OR TANDEM DRIVE**

Hewitt-Robins Mine Conveyors come equipped with both single and tandem pulley drive elements. Provide ample horsepower for lift and length up to the very limits of belt capacity. Reeving of belt handles level, uphill or downhill service requirements.

HEWITT-ROBINS

MINE CONVEYORS

HEWITT-ROBINS  INCORPORATED

BELT CONVEYORS (belting and machinery) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • POUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOK® ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

If you're still in the dark about **NEW**

INTERNATIONAL TRUCKS

CHECK THESE FACTS:—

1. Every new International Truck—from the smallest to the largest—is **heavy-duty engineered** to save you money, with the traditional stamina that has kept Internationals first in heavy-duty truck sales for 18 straight years.
2. Every new International Truck gives you the Comfo-Vision Cab, "the roomiest cab on the road"... headquarters for new comfort and ease of handling.
3. There's a new International Truck that's *right* for your job in this all-new line... the world's most complete line of trucks.
4. The world's largest exclusive truck service organization is ready to keep your Internationals operating at peak efficiency.

But get *all* the facts—see your nearest International Truck Dealer or Branch, soon.

International Harvester Builds McCormick Farm
Equipment and Farmall Tractors... Motor Trucks
Industrial Power... Refrigerators and Freezers



Turn in James Melton
and "Harvest of Stars"
NBC, Sunday afternoons



ALL NEW, ALL PROVED

INTERNATIONAL TRUCKS

INTERNATIONAL HARVESTER COMPANY CHICAGO



Save on Swing

with
MAGNETORQUE

LOOK TO **P&H** FOR ADDED VALUES!

Faster digging cycle...up to 20 percent faster...is yours with the P&H Magnetorque® electric swing. Only Magnetorque can give you faster, smoother starts and stops that make this possible. It means greater production, lower cost, and more profits. You'll say it's the greatest advancement ever made on large draglines and shovels. You can say good-bye to swing friction troubles...once and for all. Power is transmitted electro-magnetically...there's no friction...there's no wear...and far less time-outs to rob production. The smooth operating Magnetorque lasts the life of the machine.

On all kinds of digging the Magnetorque can help you cut yardage costs. Magnetorque electric swing is standard on the P&H 1055 (3½ cu. yds.) and the new 955-A (2½ cu. yds.). Write today, for more information.

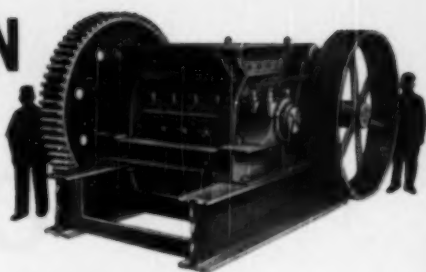
*T.M. of Harnischfeger Corporation for electro-magnetic type clutch.



EXCAVATORS • OVERHEAD CRANES • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • CRAWLERS AND TRUCK CRAN

* MODERNIZATION

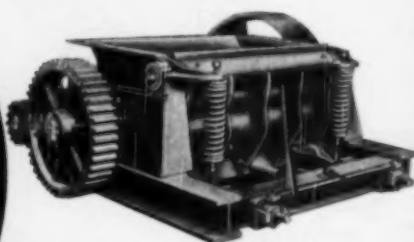
* The difference between
Profit and Loss in Today's
Competitive Market



Rockmaster Crushers

All Steel Constructed • Cast Steel Gears • Automatic Steelstrut toggle for Tramp Iron Protection • Chilled Alloy Iron or Steel, Interchangeable and Reversible Crushing Plate Liners on easily removable crushing plate • Heavy Split Bronze Bearings • Greatest Crushing Range with Opening Easily Adjustable

**M^CLANAHAN
EQUIPMENT**
is Rugged and Modern!



Black Diamond Crushers

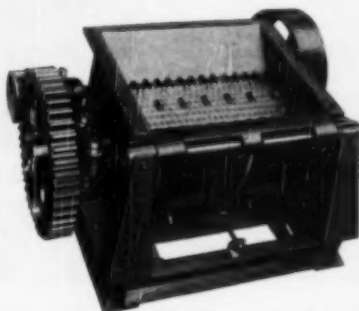
guaranteed highest ton-per-dollar value! One piece, rigid, well proportioned steel frame, cut steel gears, split bronze bearings, V-belt drive and industrial type lubrication. Automatic tramp iron protection and quick adjustment.

Typical equipment
McLanahan and Stone
designs and builds:

- Heavy Duty Rock Crushers—Automatic Steelstrut Toggle, Quick Adjustment and Planer series
- Light Duty Single Rolls—Black Diamond and Bantam Buster in steel, semi-steel or fabricated frames
- Double Roll Fabricated Steel Crushers
- Jaw Crushers
- Portable and Semi-Portable Crushing Plants
- Dry Pans Super Heavy Duty
- Conveyors
- Dryers of Revolving Type
- Elevators • Feeders
- Hoists • Ore Jigs
- Sand Drags • Screens
- Log Washers & Scrubbers
- Special Machinery and Complete Plants

Bantam Buster Crushers

The McLanahan Bantam Buster Fabricated Steel frame crushers answer the need for a dependable, low cost machine that does the job with minimum operating and maintenance expenses. These rugged, high-ratio cut gears, babbit or self-aligning roller bearing crushers take a larger feed than equivalent crushers. They easily crush different size feeds of hard and soft coal to various size products.



Headquarters for Pit, Mine and Quarry Modernization
M^CLANAHAN and STONE Corp.
HOLLIDAYSBURG, PA.

Since 1835



HEAVIER LOADING is possible on conveyor belts built with "Cordura" Rayon. This yarn is stronger than natural fibers com-

monly used. It packs extra strength into conveyor belts and enables them to carry loads to the capacity of power equipment.

WHY YOUR NEXT CONVEYOR BELT SHOULD BE BUILT ON DU PONT "CORDURA" RAYON

The next time you need a conveyor belt, ask your supplier about the remarkable performance of belts built on Du Pont Cordura® High Tenacity Rayon. This industrial rayon provides far greater strength than natural fibers commonly used, and makes a thinner, more workable belt, *at no extra cost.*

This yarn, which puts toughness in heavy-duty truck tires and makes thinner, stronger hoses, can also make more efficient conveyor belts for your mine.

We'll be glad to furnish the names of suppliers of belts made with "Cordura." You can get full information about "Cordura" in the new manual, "Sineus for Industry." It gives physical properties of "Cordura" rayon, describes many successful applications and tells how "Cordura" improves the efficiency of conveyor systems. For your free copy, address Room 4527, Rayon

Division, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

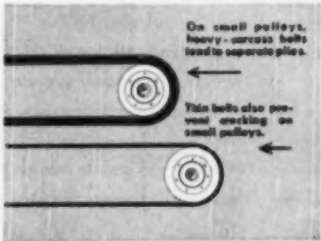
*Reg. U. S. Pat. Off.



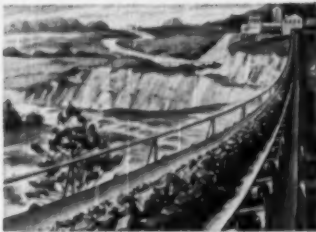
for RAYON...for NYLON...for fibers to come
look to DU PONT



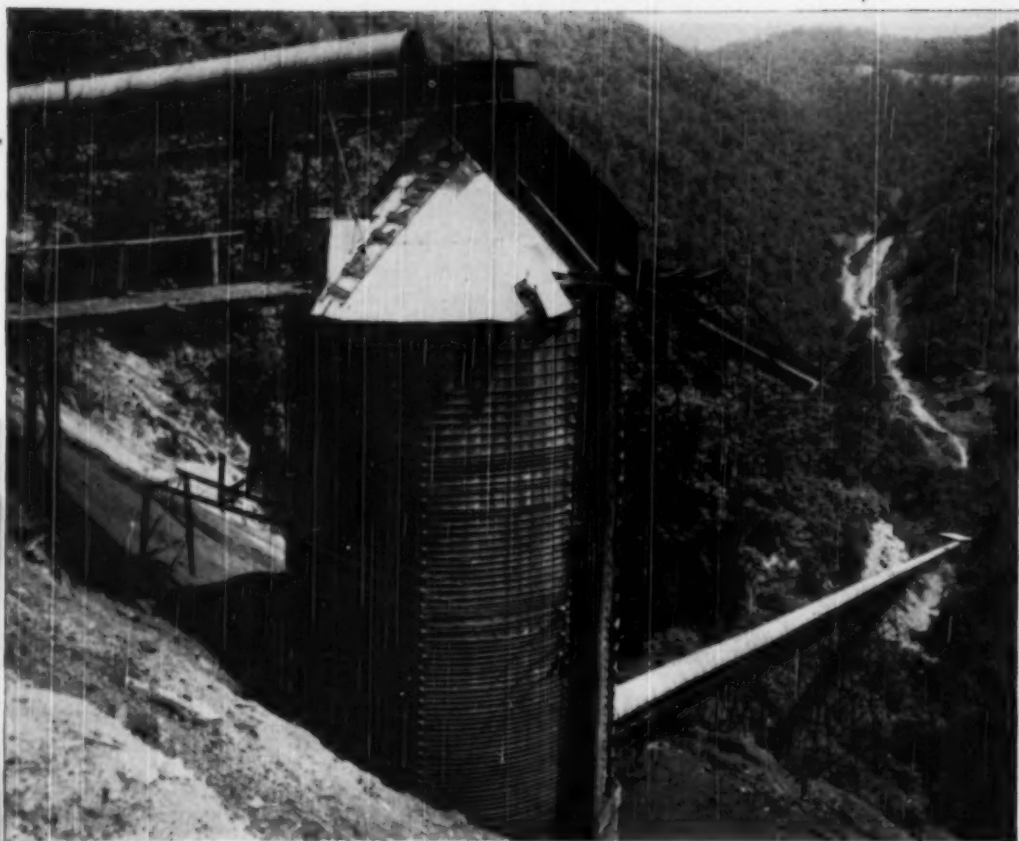
GREATER STRENGTH of belts built with "Cordura" is illustrated above. At left is cross-section of four-ply belt sinewed with "Cordura." It's stronger than conventional 6-ply belt at right, yet only half as thick. This thin, light belt is particularly desirable where panel equipment is moved frequently.



MORE FLEXIBLE. Belts built with "Cordura" have less tendency to crack and separate plies when run over small pulleys required in confined working space. And belts built with "Cordura" have less stretch, so less take-up room is needed. And they trough well under any loading conditions.



LONGER LIFTS. The high tensile strength of "Cordura" Rayon eliminates costly transfer points. For example, a belt reinforced with seven plies of "Cordura" can lift 1000 pounds of overburden per hour up a 15° slope over 1000 foot centers. It has design tension of 900 pounds per inch of width.



NEFF & FRY BIN PROVIDES STANDBY STORAGE SPACE AT CARBON FUEL COMPANY'S NOTOMINE PIT

Between 5 and 6 carloads of coal can be accumulated in the Neff & Fry Bin at the Notomine (W. Va.) pit of the Carbon Fuel Company. This standby storage space is the means of maintaining steady operation when delays occur in shipment or production. Many similar installations of Neff & Fry Bins are being used in the coal fields.

As everyone in the mining business knows, a bin has to be exceptionally rugged to serve such a purpose. Neff & Fry Bins can take it because they are built of Super-Concrete Staves

bound with heavy, galvanized steel hoops. The staves are formed under 140 tons pressure, making them rocklike in hardness and density. They have compressive strength beyond the guaranteed 5,000 p.s.i. This is evidenced by the fact that Neff & Fry Bins often carry superstructures and machinery of great weight without additional supports.

Complete information on this interesting subject will be gladly furnished upon request. You are invited to write, phone, or wire us now while you are thinking of it.



The NEFF & FRY Co.

142 SOUTH MAIN STREET, CAMDEN, OHIO

NEFF & FRY SUPER-CONCRETE STAVE STORAGE BINS

One man can drill
50% MORE HOLES
 in less time and with
 far less effort—with

the **NEW**
JOY
 RUBBER TIRE-MOUNTED
 ROOF-BOLTING DRILL

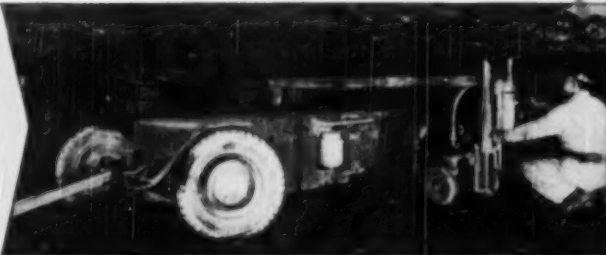


JOY Roof-Bolting Drills and Mine-Air Compressors—are available in a complete range of types and sizes to meet any requirement—are backed by more than 50 years of drill and compressor-building experience.

The other half of your Roof-Bolting Team

JOY MINE-AIR
 COMPRESSORS

Compact • Mobile • Highly Efficient



Write for Bulletins, or

Consult a Joy Engineer



WBD CL 2864

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



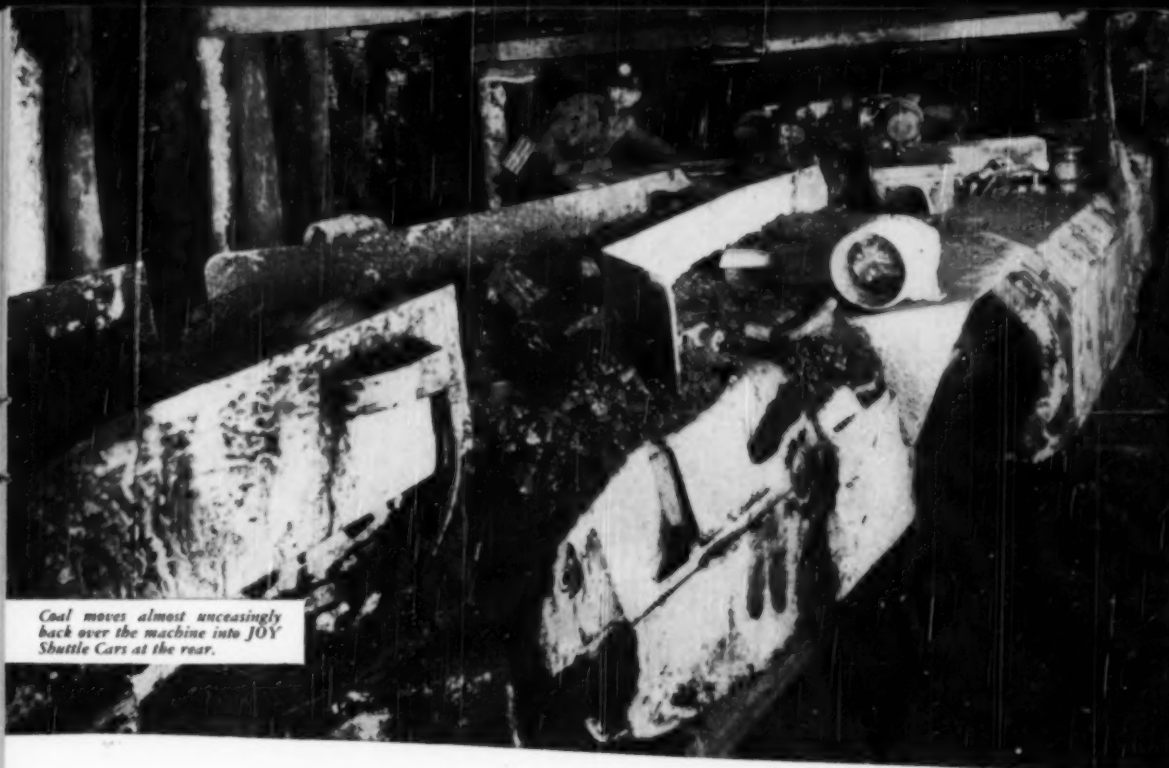
The "JCM" is really flexible—a tonnage producer in any normal bedded deposit, thin or thick.

You can use the **JOY**



**Carry your coal away from the
Continuous Miner with**

JOY SHUTTLE CARS and BELT CONVEYORS



Coal moves almost unceasingly
back over the machine into JOY
Shuttle Cars at the rear.

CONTINUOUS MINER

IN ANY MINE IT WILL ENTER

★ **FOR GREATEST
TONNAGE OUTPUT!**

★ **FOR LOWEST
OPERATING COSTS!**

Write for Bulletins or

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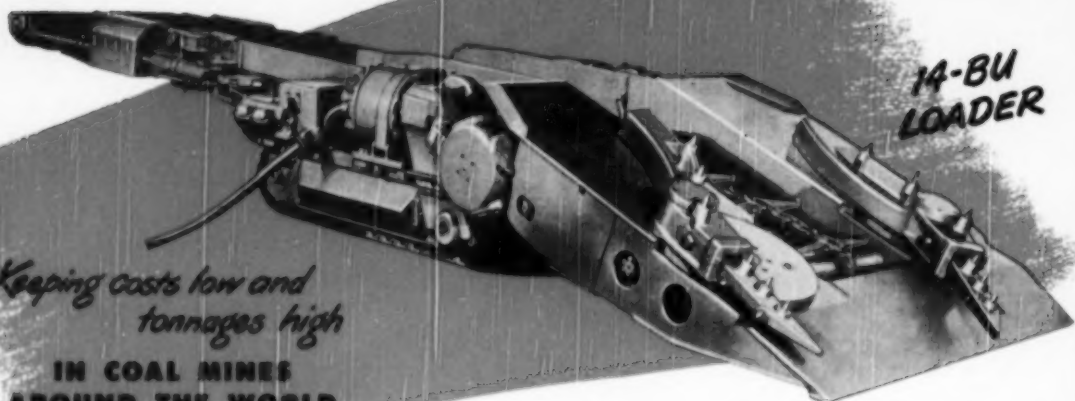


WBD CL 2029

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



**14-BU
LOADER**

*Keeping costs low and
tonnages high*

**IN COAL MINES
AROUND THE WORLD**

JOY

LOADERS, CUTTERS, SHUTTLE CARS and MOBILE COAL DRILLS

Illustrated on this page is a typical JOY "team" of high-production mining machines for thin-seam trackless operation. In soft or hard coal—no matter what your mining conditions are—you'll realize greater efficiency and economy with *field-proved* JOY Equipment . . . built by the world's largest producer of underground mining machinery.

The JOY 14-BU Loader is a high production, low vein machine with a capacity up to 8 tons a minute. Produced in heights of 30½", 33" or 36", economical in operation and rugged. Like all JOY Loaders, it is highly flexible, with a chain conveyor that swings 45° to either side.

**11-RU
GUTTER**

JOY Trackless Universal Cutters—the 11-RU for low coal and the 10-RU for thick seams—are highly maneuverable, fast, hydraulically controlled machines that can make horizontal or shear cuts anywhere in the face.



LICENSED UNDER THE PATENT
TO F. C. MORGAN NO. 1,952,325

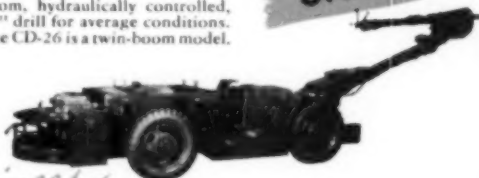
**6-SC
SHUTTLE
CAR**

The JOY 6-SC Shuttle Car is ahead of anything in its class in safety features and operating advantages. Only 29" high for thin seams—has four wheel drive, four wheel steering, hydraulically adjustable elevating discharge.



JOY Mobile Coal Drills are highly maneuverable, fast-tramming units that feature an exclusive, automatic, infinitely variable control of both rotation and feed in drilling. The CD-25 is a single-boom, hydraulically controlled, 36" drill for average conditions. The CD-26 is a twin-boom model.

**CD-25
COAL
DRILL**



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JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

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WAD CL 3046

NOW!

Mine cable with



"COLD RUBBER"

This new Securityflex* is so resistant to injury — so dependable and long-lasting in the toughest kind of shuttle car service — that it surpasses the expectations of even our own cable engineers.

**what did we do
to improve this
already famous cable?**

We improved the insulation.

We improved the grounding wire.

We improved the conductor stranding.

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results —

More flexibility: greater resistance to breakage of conductors subjected to repeated short-radius bending.

Better insulation: much tougher and more resistant to moisture and cutting.

More resistant to: short circuits, abrasion, kinking, crushing, twisting, jerking.



**New Securityflex
Shuttle Car Cable
does a
tremendously
better job!**

Strong words? We'll make good every claim. Ask Anaconda's nearest Sales Office or Distributor for supporting data — and prove it for yourself. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. 00012

*Reg. U. S. Pat. Off.

the right cable for the job **ANACONDA**
WIRE AND CABLE

A TRULY PROFESSIONAL Engineering Approach TO YOUR PROBLEMS . . .



TO ACHIEVE THESE RESULTS

- ... reduced cost of operating
- ... a more salable product . . .
- more productive manpower . . .
- more for the worker . . . a satisfactory return on investment.



Scope OF SERVICES . .

- Design and construction of new plants and their various units.
- Organization, operation, and management of mines.
- Below ground modernization and mechanization.
- Reconstruction, revamping, or improvement of existing plants.

- General consulting work regarding power, equipment, operation, and various mining problems.
- Valuations for financing, fire loss, taxation purpose — reports and appraisals.

We work with undivided responsibility to you at a fixed fee. We are not hampered by any connections which might prejudice the true professional engineering approach to your problems.

A&G engineers work for the client alone—above and below ground. Mines have been planned, preparation plants designed, and built for nearly every seam of coal being mined in the United States today.

Experienced as they are, these engineers design to eliminate excess equipment—to simplify operations—to lower maintenance costs, and being independent, they avoid red tape and many of the cumbersome procedures that develop into high costs each year.

A&G engineering is of particular importance now when costs are mounting in many directions and a sizable cut in expenses is most necessary. A cost reduction through modernization program is your answer to this need and can be effectively accomplished. A&G "on the field contacts" together with our practical experience in solving problems for mining operations throughout the world, pays off in many ways for operators.

Our services to both large and small operations are rendered on a time and material basis—you are given a definite breakdown of every item that goes into your mine.

ALLEN & GARCIA COMPANY

CONSULTING AND CONSTRUCTING ENGINEERS

332 S. MICHIGAN AVE., CHICAGO 4, ILL. • 120 WALL ST., NEW YORK 5, N. Y.

PARIS MANUFACTURING COMPANY

Announces

THREE NEW DRILLS

The PARMANCO Coal Drill will drill $2\frac{3}{4}$ inch holes at a speed of up to six feet per minute in #5 coal. Equipped with heavy duty truck-type transmission and rear end and a complete hydraulic feed, the drill is operated by one man from the control seat. It is made in two sizes with a 12 h.p. or 25 h.p. gas motor and all units are completely self-contained and enclosed in oil-tight cases.

ALREADY USED by

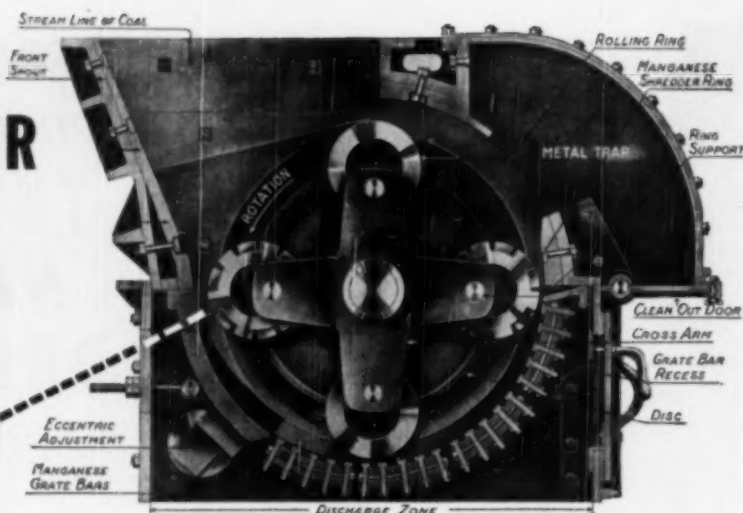
Big Bend Collieries, Inc.	1	Essex Coal Co.	1
United Electric Coal Co.	1	Southwestern Ill. Coal Co.	1
Fairview Collieries Corp.	1	Truxa-Truxa Coal Company	1
Colonial Coal Co.	1	Refractory Field	1
Little Sister Coal Co.	1	Harbison-Walker Refractories Co.	1
Hume-Blairst Coal Mining Co.	1	Mexico Refractories Co.	1
Sherwood-Templeton Coal Co.	1	A. P. Green Fire Brick Co.	1

**THIS UNIT IS DELIVERING 6-INCH SHOT
HOLES — READY FOR LOADING
at Better Than Two Feet a Minute ! ! !**

The new PARMANCO Hi-Speed Horizontal Drill is completely redesigned around a 40 h.p. engine with four drilling speeds which, in field tests, has cut one-third off the footage drilling time — a cost-per-drilling-foot saving that we are passing on to the strip mine operator and contractor at no increase in our price. In addition the drill is equipped with a starter and generator, dual type front wheels, truck type rear axle with mechanical brakes and a traction drive with both forward and reverse.

**PARIS
MANUFACTURING
COMPANY**
Paris, Illinois

SHREDDER RING ACTION



the WHY of Uniform Coal Sizing with AMERICANS . . .

Efficient coal firing depends upon uniform sizing. That's why so many power plants use American Crushers—with exclusive Shredder Ring Action. Thrust outward against the coal by centrifugal force, the flexible rings maintain constant, controlled contact . . . to *split the coal—not crush it*. The result is a uniform product with controlled fines that assures a loose, uniform, *quickly responsive firebed*—without excessive ashpit drop or unnecessary CO₂. Minimum headroom requirements and independence from auxiliary crushing permit easy, economical installation without extensive alterations.



SHREDDER RING



ROTOR

American Crusher's manganese steel shredder ring and rotor assembly—for rapid reduction at low, power-saving speeds. Each ring has 20 cutting edges . . . revolves on individual shaft, free to deflect from tramp iron without damage.

Send for your copy of
"CRUSHING COAL FOR LESS THAN 1¢ PER TON"

American

PULVERIZER COMPANY

*Originators and Manufacturers of
Ring Crushers and Pulverizers*

1119 Macklind Ave.
St. Louis 10, Mo.

Go up and Over Foster

MORE Road Days
FEWER Shop Days

GEARED TO
Make Molehills
out of Mountains

where horsepower goes to work

Fuller
TRANSMISSIONS

FULLER MANUFACTURING COMPANY Transmission Division, KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 7, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1040 E. 11th Street, Oakland 6, Calif.

A REPORT ON MINE HAULAGE SAFETY

FROM G. K. McKEE, PRESIDENT, THE ELRECO CORPORATION

Many of you have heard about—and some of you have probably seen—the new Elreco Inverted Trolley, which completely eliminates trolley poles and nips.

Thanks to this revolutionary, new development, mine operators will soon have available a far safer method of getting power from the trolley to all mobile equipment. Conversion will be easy, speedy, low in cost.

Recent official studies made in an important coal-producing state show that 18% of mine haulage fatalities are caused by trolley poles and nipping. By doing away with poles and and hand nipping, the Elreco Inverted Trolley makes it possible for operators to give full attention to controllers, brake-wheels and sand levers. Particularly advantageous when operating in low coal, the slide always follows the locomotive travelling in either direction without attention from the operator. When locomotives leave the trolley for gathering, the sliding shoe stays on the wire, and without any manipulation from the operator, fulfills the same purpose as the conventional nip.

The new Elreco Inverted Trolley replaces the conventional pole and collector with a sliding shoe which rides on top of the wire. To the shoe is attached an arm and a fuse. The whole assembly is connected to a trailing cable which serves both to pull the shoe along and to carry current from trolley wire to equipment. The arm is pinned to allow free swing according to the direction of travel.

Thus, the hazard in operating electrical haulage equipment is reduced to a minimum. The operator no longer has to back-pole, reverse his pole, or handle nips. At the same

time, equipment maintenance is materially reduced by the elimination of shock to motors, gears, etc. that comes from breaking and making contact under power. Arcing, also an important factor from the standpoint of safety and maintenance — is reduced an estimated 90% over the conventional method.

The Elreco Inverted Trolley has been thoroughly tested in the Cannelton Coal and Coke Company's Lady Dunn Mine No. 100 at Cannelton, West Virginia. It has been in continuous operation for the past five months and has proved extremely successful. This test has encouraged us to put the Inverted Trolley on a production basis. We expect that it will be ready in the very near future for the many of you who have written and requested information.

Working models of the Elreco Inverted Trolley will be on display August 16 through 19—Southern Appalachian Industrial Exhibit, Bluefield, West Virginia—Booth No. D-21.

August 28 through 31—Metal Mining Convention and Exposition, Salt Lake City, Utah, Booth 156.

September 25 through 27—Mining Electrical Group, West Frankfort, Illinois.

For further information write me personally c/o Elreco, 2900 Corman Street, Cincinnati 25, Ohio. I will send you the latest details as soon as they are available.

Elreco also manufactures expansion units for roof bolting, overhead trolley material, junction boxes, trolley taps and miscellaneous safety devices.

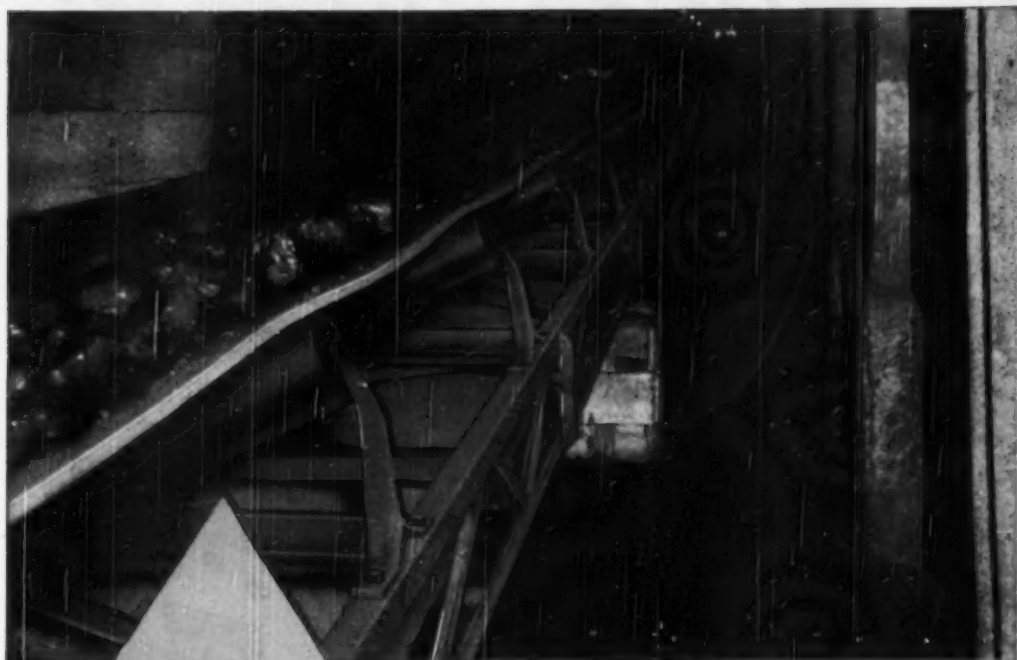


PRESIDENT

THE ELRECO CORPORATION *Serving the mining industry since 1892*

2900 CORMAN STREET, CINCINNATI 25, OHIO

Barber-Greene



All-welded steel
Belt Carriers



Available in roller, ball or plain bearings
"Four-pass" grease seal protects bearings

EASY TO CHOOSE . . . EASIER TO USE! Belt Conveyors!



Barber-Greene "pre-engineering" simplifies your selection of the right, most economical belt conveyor set-up for your jobs. Standardized units—carriers, frames, take-ups, drives—are factory aligned, interchangeable. You can easily choose the units you need to make up a complete conveyor that's especially fitted to your material-moving problem. And, when they're delivered on the job, you'll find them plainly marked for quick installation with a minimum of "blueprint" work or on-the-spot fabrication. To gain these two big advantages—that have saved money for hundreds of Barber-Greene users—see your Barber-Greene distributor.



BARBER-GREENE COMPANY • AURORA, ILLINOIS

Constant Flow Equipment



LOADERS



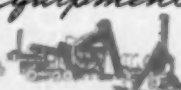
PERMANENT CONVEYORS



PORTABLE CONVEYORS



COAL MACHINES



BITUMINOUS PLANTS



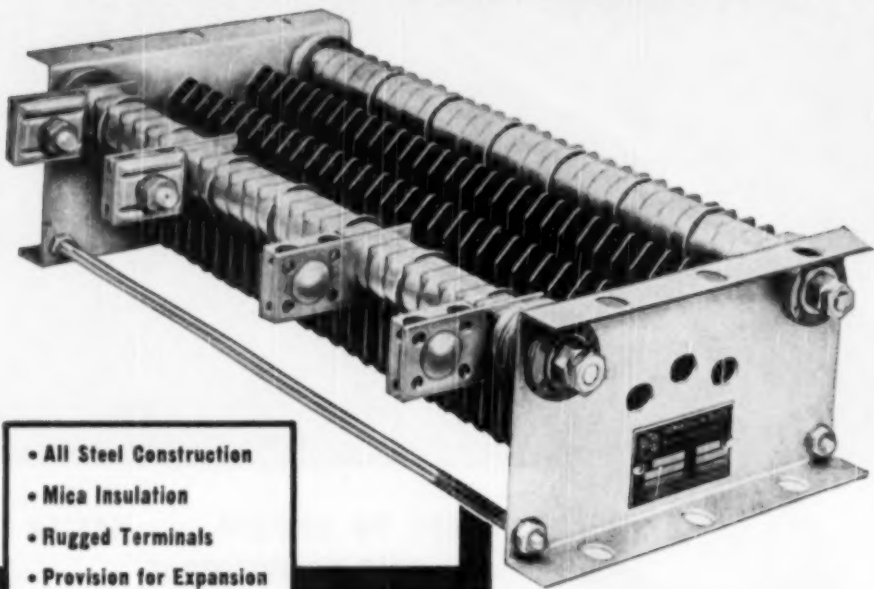
FINISHERS



DITCHERS

A Grid Design

**TO ELIMINATE HOT SPOTS ...
and INSURE EVEN HEAT DISTRIBUTION!**



- All Steel Construction
- Mica Insulation
- Rugged Terminals
- Provision for Expansion
- Adequate Ventilation
- Unaffected by Vibration or Moisture
- Corrosion Resistant

The unique shape of P-G Resistor Grids permits unusually even heat distribution over the entire grid surface. Since each part of the resistor element has relatively equal exposure to the air, heat is rapidly dissipated and hot spots fail to develop. For trouble-free, heavy-duty service, you can safely specify P-G.

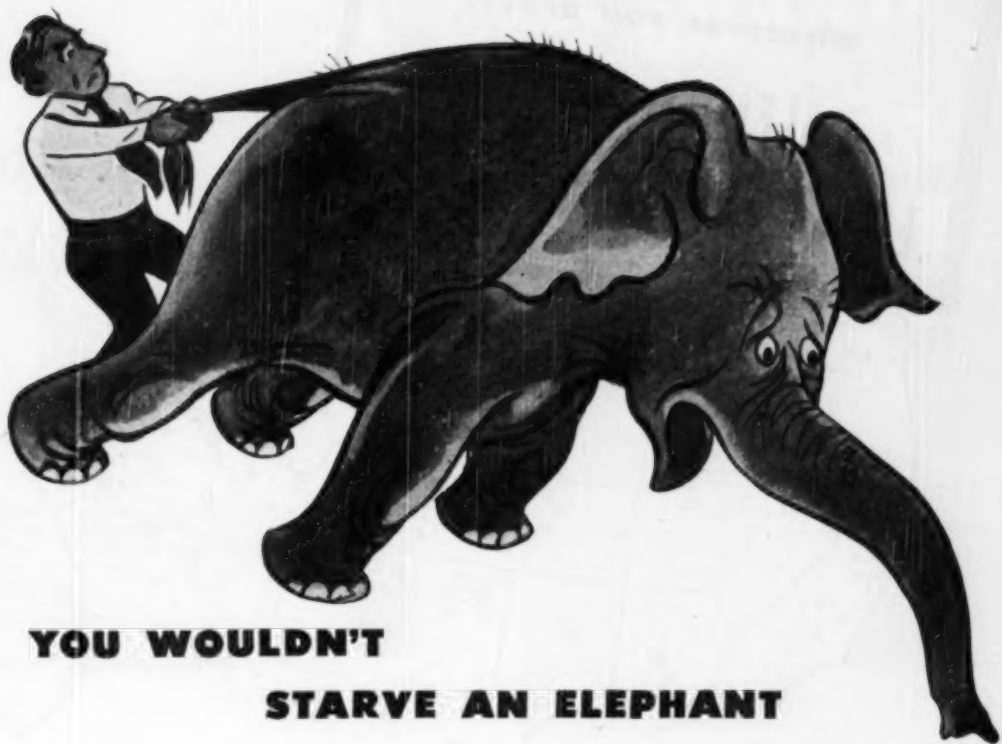


The Nonbreakable Steel Grid Resistor

THE POST-GLOVER ELECTRIC COMPANY

• ESTABLISHED 1890 •

221 WEST THIRD STREET, CINCINNATI 2, OHIO



**YOU WOULDN'T
STARVE AN ELEPHANT**

...TO SAVE PEANUTS!

No, and it's just as unsound to risk loss of valuable machinery and production for the sake of saving "peanuts" on initial oil costs. For lubrication is not just "oils and greases" . . . it's also knowledge of machinery, the right lubricants to use, and where and how to use them.

That's why you save so many ways with Socony-Vacuum *Correct Lubrication* . . . a custom-made program of lubrication for your plant that pays off in greater output per machine, less friction loss, lower maintenance costs, and—ultimately—lower lubrication costs.

For the *genuine* savings of *Correct Lubrication*, call your Socony-Vacuum Representative.



SOCONY-VACUUM
Correct Lubrication


**WORLD'S GREATEST LUBRICATION KNOWLEDGE
AND ENGINEERING SERVICE**

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

wherever you are...

ALEMITE OFFERS LOCAL SERVICE & SUPPLY



 Alemite Branch
• Service Jobber and
Industrial Distributor

Over 1700 Alemite Service and Supply Centers Assure You Quick, Efficient Service—On the Spot!

That's why Alemite customers from coast to coast save time, trouble and money—daily! They depend and call upon this vast, national network of experienced lubrication specialists. And so can you!

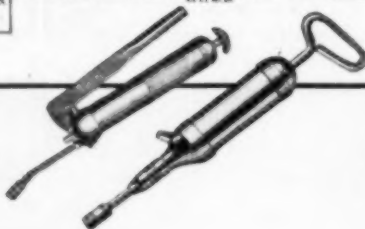
Every Alemite Service Center is staffed by qualified personnel, ready to offer experienced counsel and rapid aid on any lubrication problem you face. Fast, on-the-spot service is a habit, not an occasion, with

these local Alemite branches, distributors and service jobbers. They are equally "at home" with maintenance, repair or supply problems. And they know what "hurry" means!

Write today for the name and address of your nearest Alemite representative. Address your proposal to Alemite, Dept. E-80, 1850 Diversey Parkway, Chicago 14, Illinois.



ALEMITE



Note the "Contour-
for Clearance" Design



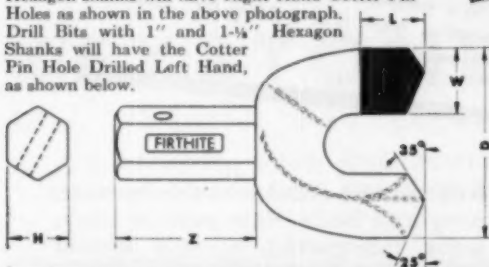
HEX-SHANK AUGER DRILL BITS

A COMPLETE LINE OF BITS
For shooting with Armstrong, Girton
and Cordox Colliders

Unless otherwise specified—Drill Bits with 13/16" Hexagon shanks will have Right Hand Cotter Pin Holes as shown in the above photograph.

Drill Bits with 1" and 1-1/4" Hexagon

Shanks will have the Cotter Pin Hole Drilled Left Hand, as shown below.



DIMENSIONS IN INCHES

Style No.	Shank Sizes			Tip Sizes		
	D	H	X	L	W	Thick- ness
D-2 1/4-13	2-1/4	13/16	2-1/4	7/8	3/4	5/32
D-2 1/2-13	2-1/2	13/16	2-1/4	1	13/16	5/32
D-2 3/4-13	2-3/4	13/16	2-1/4	1	7/8	5/32
D-2 1/2-16	2-3/4	1	2-1/4	1	7/8	5/32
D-2 1/2-16	2-7/8	1	2-1/4	1	15/16	5/32
D-3 -13	3	13/16	2-1/4	1	1	5/32
D-3 -16	3	1	2-1/4	1	1	5/32
D-3 -18	3	1-1/8	3	1	1	5/32
D-3 1/4-18	3-1/4	1-1/8	3	1	1-3/32	5/32

Full line of SQUARE SHANK Firthite Auger Drill Bits in Auger Diameters ranging from 1/4" to 3/4"

Write, wire or phone your orders Today!

FIRTH STERLING DISTRIBUTORS

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PERSINGER'S, INC.
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PERSINGER SUPPLY CO., INC.
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Denver 2, Colo.
Telephone Alpine 2091

Ask for catalog Section 90-000

Better
DRILLING

One driller reported drilling 600—
8-foot holes in coal—
No resharpener required!

Faster
DRILLING

One three-drill tram drilled 104—
8-foot holes in 7 1/2 hours in coal
having heavy sulphur streaks!

Cheaper
DRILLING

A minimum of bit change time re-
quirement—more drilling finished
per hour—better and faster drill-
ing is cheaper drilling.

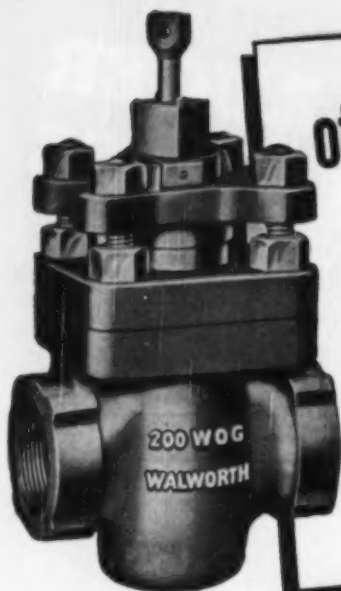
R-191

Firth Sterling

STEEL & CARBIDE CORPORATION

McKEESPORT, PA.

WALWORTH LUBRICATED PLUG VALVES



offer these advantages

- ... Direct port opening
- .. Quarter turn opens or closes valve
- ... Dead tight shut-off
- ... Freedom from attack by fluids being handled
- ... Pressure sealed
- .. Made in a complete line. Sizes from $\frac{1}{2}$ " to 26" for pressures from 175 to 5,000 psi., and for vacuum requirements

THESE are just a few of the reasons why Walworth Lubricated Plug Valves give "top" performance on many difficult services.

All Walworth Lubricated Plug Valves employ special insoluble lubricants which protect the plug and body against contact with the line fluid, thus combatting erosion and corrosion.

The lapped surfaces of the valve are "pressure sealed" when the valve is in either the open or closed position. By turning the lubricant screw, lubricant is forced under high pressure through a grooving system that completely encircles the ports as well as the top and bottom of the plug.

The lubricant seals the valve against

leakage, and reduces friction between plug and body. This permits easy, quick, full-opening, or tight shut-off with only a quarter turn of the plug.

Number 1700 (illustrated) is a Steel-iron valve, wrench operated, designed for a working pressure of 200 pounds WOG (water, oil, or gas). Valves are available in either screwed or flange types. Screwed type have API line pipe thread lengths. Flanged type (No. 1700F) is faced and drilled to American Standard for 125-pound cast iron flanges unless otherwise specified.

For further information about No. 1700 as well as the complete line of Walworth Lubricated Plug Valves, write for catalog.

WALWORTH valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

**TROUBLES
THAT START
HERE →**

END HERE →

KEYSTONE BALL BEARING END BELLS

... Are Answering Motor Maintenance Problems on Thousands of Installations

The ability of the grease-packed, KEYSTONE BALL BEARING END BELL to solve the most difficult of all motor maintenance problems — dirt and oil on the commutator — is just one reason why this conversion is economical, practical and many times a necessity.

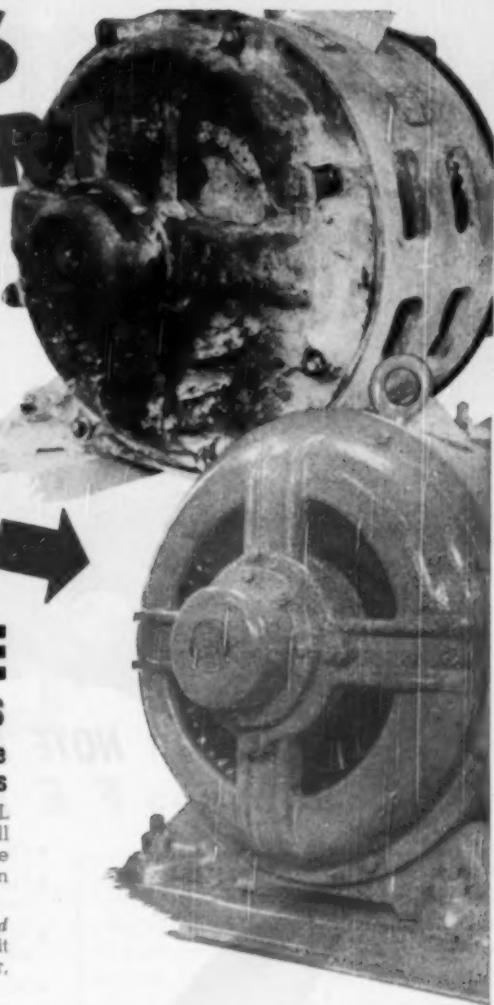
The KEYSTONE END BELL is a *sealed, grease-packed unit* incorporating ball bearings . . . designed to fit (without machining) any well-known make of motor, in any size or type.

The KEYSTONE END BELL will give motors a new "lease on life" — will help you keep valuable and critically scarce equipment in service much longer than in the past!

Maintenance men will welcome the KEYSTONE END BELL for it eliminates the lubrication of sleeve bearings — keeps oil from the commutators and mica cone. The KEYSTONE END BELLS are easily installed and if it becomes necessary to dismantle the motor, remove the rim bolts and the four cap screws at the

center hub and the end bell slides off, leaving the bearing housed in the cartridge.

A folder giving complete information and specifications is available for your use, write or call us.



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TENNESSEE BEARINGS, INC.

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6 PROX

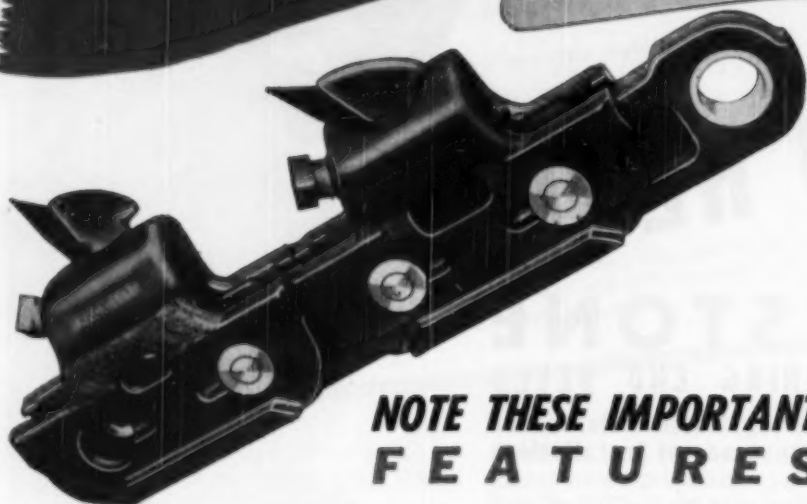
CHAIN FEATURES

Combine TO GIVE YOU THESE BENEFITS... **QUICK AND EASY MAINTENANCE**

DEPENDABILITY

EXTRA LONG SERVICE

ADDED SAFETY



NOTE THESE IMPORTANT FEATURES

- Of strapless design—it is rigid and compact.
- No bulky heads that must be pulled through the cutting operation.
- Interlocks are machined—pins and bushings are hardened for longer cutting life.
- No chain whiplage as it comes off the drive sprocket.
- Sumps easier—cuts easier thereby eliminating the cloud of dust normally created in the cutting operation.
- Parts may be easily replaced in a few minutes on the job.

PROX DUO BIT

• The Prox Duo Bit is designed to give coarse cuttings—yet it is rugged enough to withstand the hardest of cuttings.
The Prox Duo Bit is held by only one moving part—no other parts for you to keep in your stock bins.

Send for Circular

FRANK PROX COMPANY
TERRE HAUTE, INDIANA

PROX

ON THE BANKS OF THE WABASH — SINCE 1875

if it's hot....



put it on a Republic hot material conveyor belt



Mr. Luis Zork, President, Zork Hardware Company, Republic Distributor in El Paso, Texas, supplied International Minerals & Chemical Corporation at Carlsbad, New Mexico, with the Republic Super Excess Hot Material Belt shown above. This belt operates 20 hours per day, carrying hot (325° F.) potassium salts. Conditions are grueling, yet performance records: "excellent!"

● Yes, it makes sense. Most hot material conveyor belts just can't take it because their fabric muscles dry up, char and break. Republic Hot Material Belts are built with **extra** capacity. They have specially treated carcasses and insulating outside covers that resist heat and oxidation . . . covers that outwear and outlast standard belts. There's a special Republic Hot Material Belt made for your needs, and your local Republic Distributor knows exactly the one to give you most service at lowest cost. Contact him today or write direct for information. Remember, Republic Rubber has been the specialist in the field for nearly a half century.

INDUSTRIAL RUBBER PRODUCTS BY
REPUBLIC RUBBER DIVISION

Lee Rubber & Tire Corporation
YOUNGSTOWN, OHIO



***COLOR**



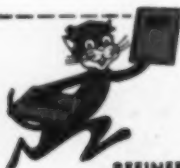
For maximum production . . . top efficiency . . . lowest operating cost, give your machines the finest in lubricants—give them Tycol oils and greases.

Tycol lubricants are made to meet every lubrication need of industry—from roll neck greases for steel mills to spindle oils for textile plants. Each Tycol lubricant is subjected to rigid tests during manufacture. This control assures the required lubrication characteristics—*COLOR, penetration, viscosity, to name a few—for maximum performance of that particular product. At every step from selection of crudes to blending of the finished product, Tycol lubricants provide maximum lubricating efficiency which means greater economy, longer life for every type of equipment.

Tide Water Associated will be glad to assist you in selecting the Tycol lubricant best suited to your specific need. Call or write your nearest office for further details.



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LEARN WHAT THIS PRODUCT CHARACTERISTIC MEANS TO YOU — READ "LUBRICANIA"
This informative handbook, "Tide Water Associated Lubricania," gives clear, concise descriptions of the basic tests used to determine important properties of oils and greases. For your free copy, write to Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

REFINERS AND MARKETERS OF VEEDOL — THE WORLD'S MOST FAMOUS MOTOR OIL

Unmatched for ***STEADY BIG*** Output— ***RED ARCH BUCKETS***

Performance of dragline buckets on coal stripping operations consistently shows that the bucket with the Red Arch leads 'em all in steady, big output. Ask owners why—they'll tell you these buckets deliver the fast, smooth digging cycles that pile up greater yardage shift after shift . . . have the long-life dependability to keep going for higher output, surpassing all other makes in time put in, in overburden taken out!

Fast, Smooth Digging Cycles Watch a Red Arch in action. Note how the bucket gets into a good digging position the instant it hits the ground . . . how the high, strong arch permits loads to flow in easily for heaped filling. In the swing, notice how the careful design of this bucket cuts bobbing and spilling even with a heaped load and a fast swing. Look at the quick, clean dumps. Check the load volume, the cycle time — above all, find out how long the bucket has been in service, how little time has been lost for repairs.

Long-Life Durability The body is alloy-steel, arc welded to form a single, strong unit that will stand up in hard digging service. The powerful cast lip, which takes the tough digging impacts, is riveted to the body and arch so it can easily be replaced. The rest of the bucket is welded for strength and lightness with adequate reinforcements wherever needed.

These are some of the reasons why Bucyrus-Erie Red Arch buckets give steady, high output — reasons why these buckets are unmatched in output over the 'long pull'.

28R500



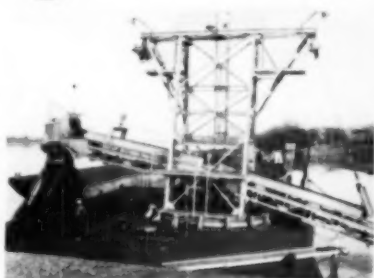
South Milwaukee, Wisconsin



THIS WEST VIRGINIA STAR PERFORMER MAKES NEWS AGAIN

Yes . . . the Truax-Traer plant at Ceredo, West Virginia, again hits the headlines. First, this great installation on the Ohio made news with its modern coal preparation plant for handling 800 tons per hour . . . coal that comes from distant mines, and converges at this central plant for upgrading.

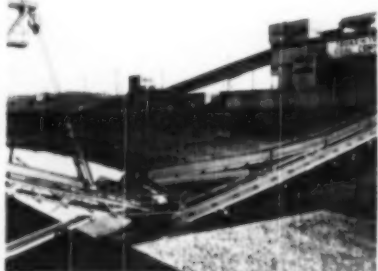
Now, another innovation captures the eyes of the world . . . the new McNally Pittsburg barge loading plant. With this modern loading equipment, the current output of 960 tons per hour can be loaded automatically into waiting barges at all stages of river level.



The electrically controlled boom discharges coal of predetermined sizes into the waiting barges

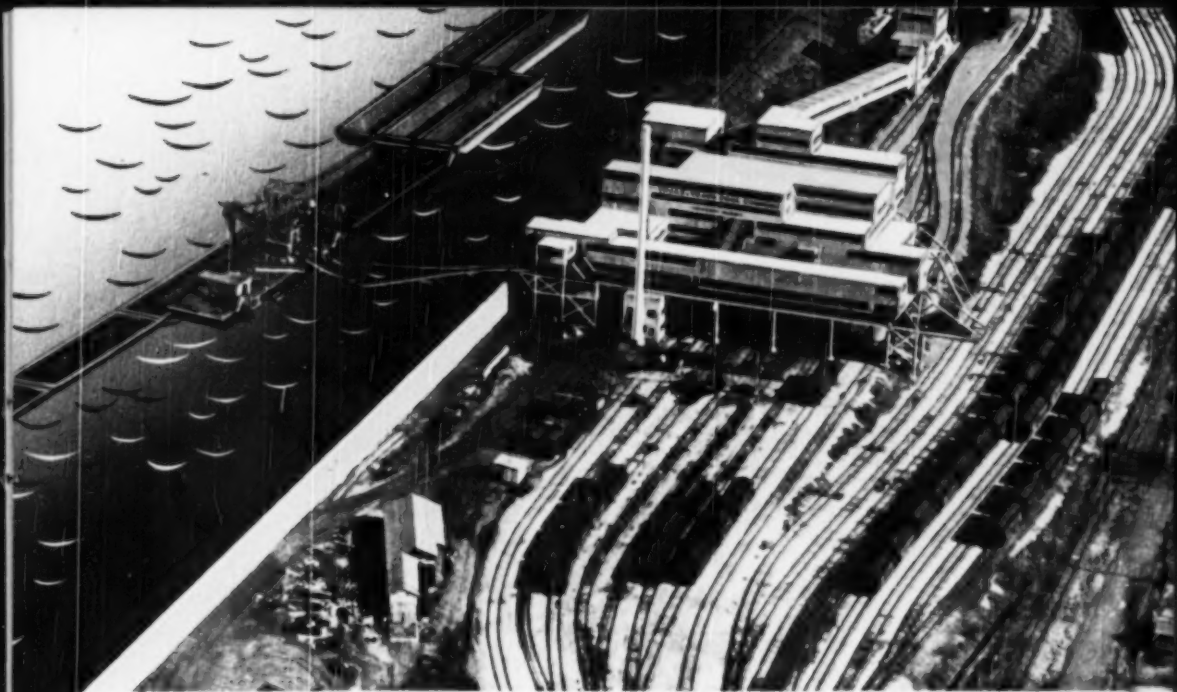


At low water, the Truax-Traer loading facilities adjust to meet river conditions



The retractable conveyor discharges the coal into the barge loading boom





RIVER LOADING HAS BEEN ADDED

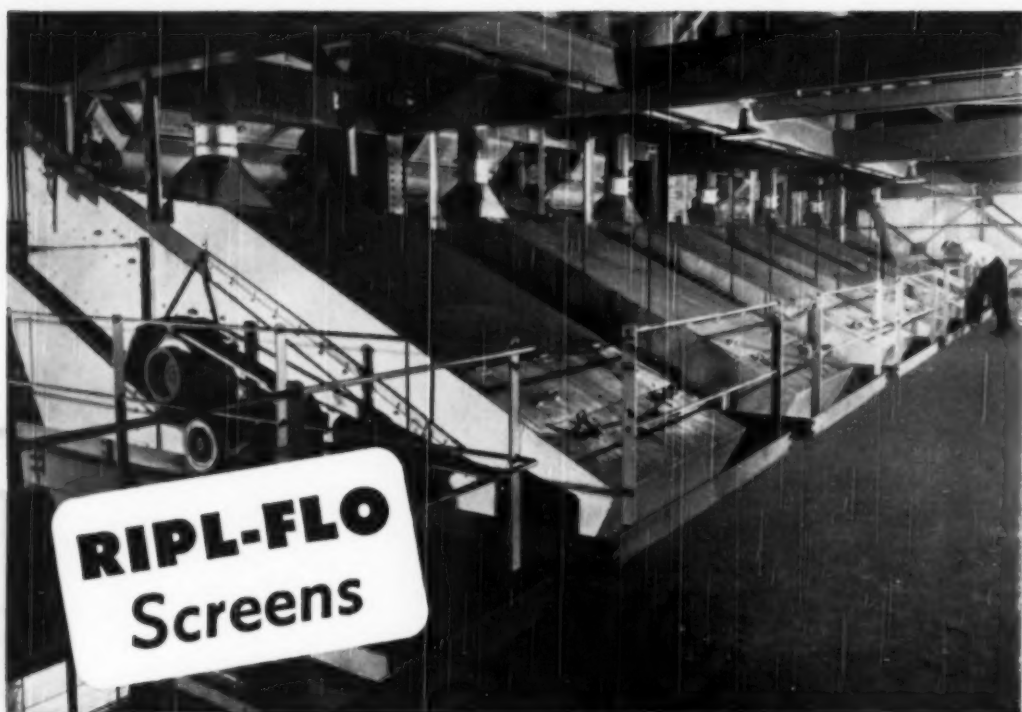
The Ceredo plant's conveyor and barge boom are mechanically retractable. Like a giant steel neck, the boom advances or withdraws to meet the Ohio's varying moods. At flood time, the conveyor positions for the rising waters; as the river recedes, it follows the drop.

Our technical staff will gladly supply you with information about preparation equipment . . . to keep pace with new demands on your horizon . . . whether you need specialized equipment—like that at Ceredo—or standard McNally Pittsburg units of proven efficiency and output.



McNally Pittsburg Manufacturing Corporation—Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio
Engineering and Sales Offices: Pittsburgh • Chicago • Rio de Janeiro • Pittsburg, Kansas • Wellston, Ohio





Here's Fast, Efficient Coal Grading, at 526 Tons an Hour!

HERE, IN Pittsburgh Coal Co.'s (Division of Pittsburgh Consolidation Coal Co.) Mathies cleaning plant, this battery of six 6 x 16 ft single deck *Ripl-Flo* screens with stationary dust enclosures remove a $\frac{3}{8}$ x 0 product from a feed of 624 TPH of 2 x 0 raw coal.

Circular motion to every part of screen deck results in rapid stratification and high capacity, with no "dead" spots anywhere on screen surface.

Another reason this coal company chose *Ripl-Flo* screens—they're built with only two bearings instead of four. Width is reduced 17%; weight by as much as 36%! Think what that means in terms of low maintenance and operating costs.

Ripl-Flo vibrating screens have

proved a good investment for all these coal applications:

- ▶ Pre-sizing raw coal ahead of cleaning units.
- ▶ Final sizing and re-screening to egg, range, nut and stoker grades, with 2, 3 or 4 separations.
- ▶ Refuse sizing and dewatering.
- ▶ Heavy-Duty *Ripl-Flo* screens handle ROM coal in sizes up to 22 inches.

The Allis-Chalmers representative in your area will gladly look over your cleaning plant, point out how *Ripl-Flo* screens may reduce your preparation costs. Call him today, and write for Bulletin 25B6280A, covering all Allis-Chalmers products for coal.

A-2923

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.



Ripl-Flo and *Texrope* are
Allis-Chalmers trademarks.

"TEAM UP" COAL PROCESSING EQUIPMENT WITH A COMPLETE ALLIS-CHALMERS DRIVE!



Motors — Controls



Texrope Drives

OTHER COAL EQUIPMENT



Vibrating Screens



Centrifugal Pumps



Hoists



Rectifiers

ALLIS-CHALMERS

For greater
SPEED...
STABILITY...
SMOOTHER
RIDING...



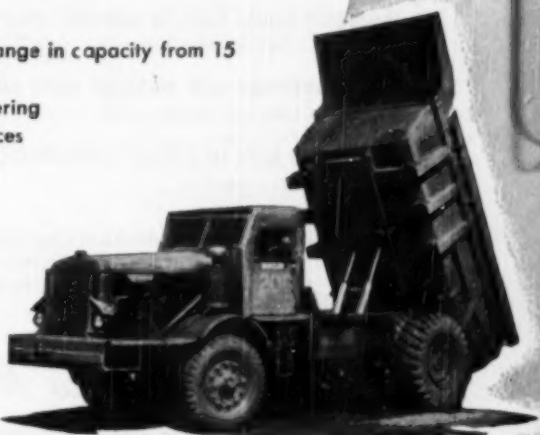
SPRING MOUNTED REAR-DUMP EUCLIDS

This new line of spring mounted Rear-Dump Euclids is designed for greater speed and stability on the haul road and long life in off-the-highway service. Heavy leaf springs are free floating in spring brackets to assure smooth riding and prevent breakage caused by twisting action on rough roads. Axles are positioned to the frame by longitudinal radius rods.

Rear-Dump Euclids with spring mounted drive axles range in capacity from 15 to 34 tons . . . diesel engines to 380 horsepower . . . and have travel speeds up to 32.2 m.p.h. Hydraulic booster steering assures positive control over all road conditions and reduces driver effort on sharp turns and rough hauls.

Built to the same high standards of construction and design that have made "Eucs" the favorite for tough hauling jobs, these improved models provide outstanding performance and lowest cost per ton or yard moved. Your Euclid distributor will be glad to show you how Euclid equipment can help cut your hauling costs and make more profit for you.

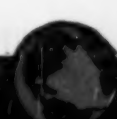
The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO



EUCLIDS



Move the Earth



NEVER BEFORE

A Supreme Highway Tire with "Off-the-Road" Traction Never Possible Before!

NOW YOU HAVE THEM

- FOR ON-AND-OFF-THE-ROAD PERFORMANCE *never known before*
- FOR NON-SKID SAFETY *never known before*
- FOR ALL-ROAD, ALL-LOAD MILEAGE *never known before*
- WITH JOB-FITTED TREAD COMPOUNDS *never known before*

JOB FITTED TO YOUR EXACT REQUIREMENTS

No More Layovers That Waste Away Profits

- ★ FROM LOADING IN THE SAND-PIT AND GUMBO TO SMOOTH HIGHWAY ROLLING—*Job fitted—One and the same tire*
- ★ FROM SOFT FOREST TRAIL TO NON-SKID HIGHWAY SPEEDS—*Job fitted—One and the same tire*
- ★ FROM BARNYARD AND MILKSHED ONTO THE HIGHWAY—*Job fitted—One and the same tire*
- ★ FROM RIVER BEDS TO ASPHALT AND CONCRETE—*Job-fitted—One and the same tire*

The Great On-and-Off-the-Road Fleets Welcome
the Great Job-Fitted Fleetmasters
That Save Money and Build Up Profits



The Great New Mid-Century
U. S. ROYAL FLEETMASTER

UNITED STATES RUBBER COMPANY



Check and Double-Check



✓ for safe, economical stripping...you can't find a better line of products!

✓ **DU PONT "NITRAMON"** speeds coal production . . . gives excellent results. Safe and easy to handle, it's packed in water-tight metal cans for safe loading far in advance of firing time. "Nitramon" contains no nitroglycerin—is non-headache producing—a favorite choice of stripping operators.

✓ **"NITRAMON" PRIMER**, itself relatively insensitive, provides efficient detonation of "Nitramon"

using "Primacord."

✓ **"MS" DELAY ELECTRIC BLASTING CAPS** provide short-interval firing. Caps are available in eight 25-millisecond intervals of delay: MS-25, -50, -75, -100, -125, -150, -175, -200.

✓ **DU PONT BLASTING TIMER** . . . a most dependable means of short-interval firing...utilizes either 110, 220, 440 or 550 volt, 60-cycle power supply. Choice of 0.010,

0.015, 0.020 and 0.025 second is provided to reduce vibration and increase fragmentation.

Ask your Du Pont Explosives representative about these and the many other dependable Du Pont explosives and accessories for economical coal production. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

DU PONT "NITRAMON"

Blasting Supplies and Accessories



BETTER THINGS FOR BETTER LIVING
...THROUGH CHEMISTRY

Figures can be good friends of yours



They can tell you, for instance, whether your wire rope is giving you a big dollar's worth . . . whether it's a bargain in the true sense of the word.

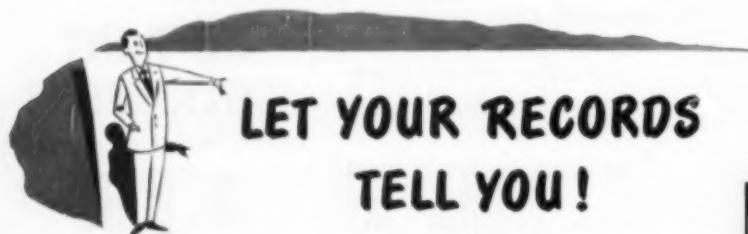
They can tell you the total amount of work it does in its life, and the cost per unit of work—the only *true* cost. Bethlehem strongly suggests you keep figures on wire-rope performance, so that you will know at all times which brand of rope is doing the best, most economical job for you.

Obviously, we feel that Bethlehem rope will stand

out in any such comparisons. We welcome comparisons as a means of proving the basic economy of Bethlehem rope—economy every user can prove with a simple system of records.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation, Export Distributor; Bethlehem Steel Export Corporation



LET YOUR RECORDS TELL YOU!



20

Years of Continuous Service

ARNEY F. NASH, President and General Manager

THE LEYDEN LIGNITE COMPANY

1 Tramway Bldg.

TELEPHONE MAIN 8111, BRANCH 234

Denver 2, Colorado



A. R. Wilfley & Sons,
Denham Building,
Denver, Colorado.

April 1st, 1950

Gentlemen:

Dependability, efficiency and cost-saving economy are built-in features of every WILFLEY Sand and Acid Pump. Individual engineering on every application. Write or wire for complete details.

Buy WILFLEY
for Cost-Saving
Performance

I understand that your Mr. Elmer Wilfley is out of the City and upon his return I wish you would show him this letter and express to him our appreciation of the fact that this pump has been in service over twenty years ago and it has been in continuous service ever since with no repairs - a remarkable achievement.

Yours very truly,

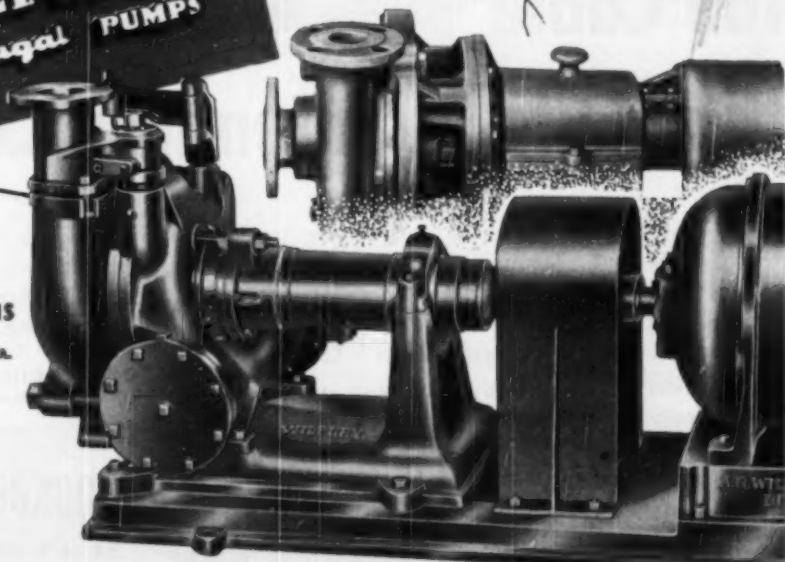
THE LEYDEN LIGNITE COMPANY,

BY *Arney F. Nash*
President and General Manager.

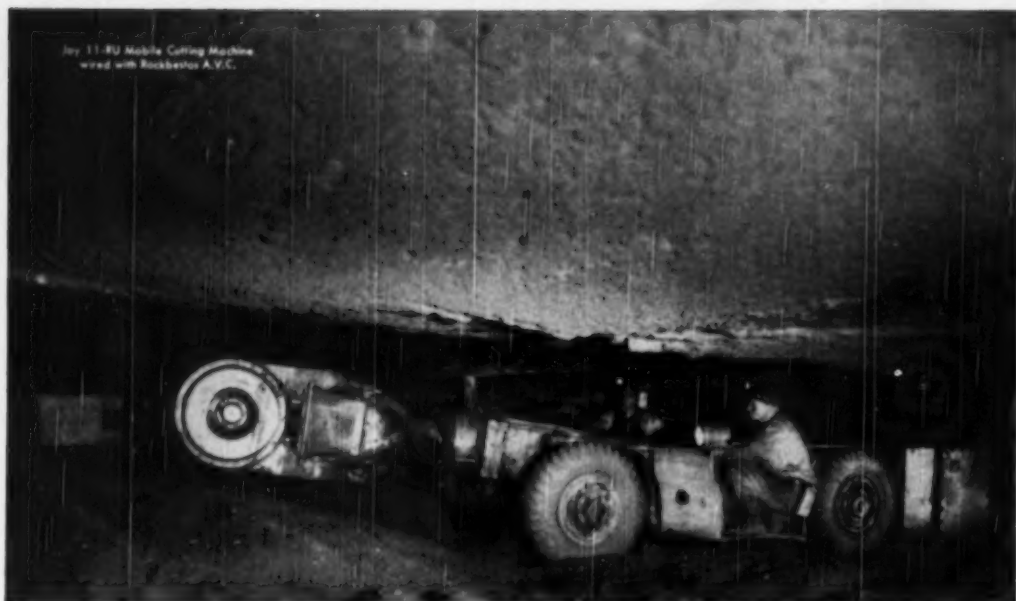
WILFLEY
centrifugal PUMPS

A. R. WILFLEY & SONS
INC.
DENVER, COLORADO, U. S. A.

New York Office:
1773 Broadway
New York City, N. Y.



Jay 11-RJ Mobile Cutting Machine
wired with Rockbestos A.V.C.



A Cost-Cutting Undercutter...

IT'S WIRED WITH

the Cable



that Cuts Maintenance Costs

When it comes to designing cost-cutting mining equipment . . . equipment capable of years of trouble-free service...the pace-setting manufacturers of mechanized mining equipment consistently pick Rockbestos A.V.C.*

Little wonder, for this sturdy cable was expressly built to take the toughest mining abuse. Insulated with varnished cambric and impregnated felted asbestos, it can't burn . . . resists moisture . . . stands up under heat.

You'll find it will pay to follow the lead of these top manufacturers. So, always specify Rockbestos A.V.C. when buying new equipment . . . when rewiring older machines.

*Reg. U. S. Pat. Off.

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OAKLAND, CAL.



ROCKBESTOS A.V.C.

has a HIGHER AMPERE RATING



Huge *one piece* BWH Belt DESIGNED TO CUT WASTE LINES!

When BWH engineers were called on to produce a fast, power-saving, economical belt for a coal mine, this 13-ton Silver King ROTOCORD BELT was the result. It's one of the largest one piece conveyor belts ever produced. Made by the famous, exclusive BWH ROTOCURE Process of continuous vulcanization, this giant is 1576 feet long,

48 inches wide. It will haul better than 500 tons an hour on a rugged grade at the fast clip of 400 feet per minute. Maintenance worries are lessened by the absence of splices. It's another top performance by BWH . . . leaders for 71 years in the manufacture of mechanical rubber goods of dependable ruggedness for use in all industries.

HAVE YOU A JOB WHERE STAMINA COUNTS? Bring us your toughest problems. We're specialists in solving them. Consult your nearest BWH distributor or write us direct.

BWH



DEPENDABLE RUGGEDNESS

This is the ROTOCURE Process of continuous vulcanization, exclusive with BWH. It does away with the 30 to 40-foot overlaps occurring in the duck carcass in old-fashioned flat-press curing, eliminates the possibility of operational weakness caused by such overcuring.



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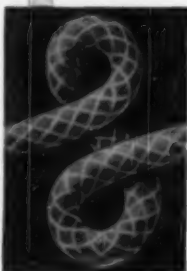
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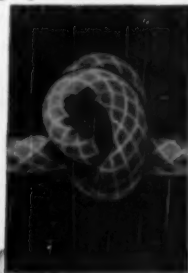


Plastic Reinforced Primacord is recommended for "down" lines where you formerly used Wire Countered Primacord.

1. To make the most effective hookup, use a simple clove hitch in the ground line, as shown in these three photographs.



3. Pass the Plastic Reinforced Primacord through this hole and draw the knot up tight.



2. The twin loops have been folded over to form a hole.

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AUGUST, 1950

IVAN A. GIVEN, EDITOR

New Tempo in Coal

ALL INDICATIONS are that 1950 will be a good coal year—much better in fact, than it appeared only a few months ago when the new wage agreements brought to an end one of coal's more-costly and frustrating sieges of work stoppages and production restrictions and left the industry facing one of the toughest competitive situations in history. Nevertheless, anthracite and bituminous production are running at high levels, with anthracite so far actually well ahead of 1949. In addition, the sudden change is the market outlook early in July makes production prospects even better. That change reflects, in part, increases in the price of heavy fuel oil along the Atlantic Seaboard, a quickening of the industrial-production tempo as a result of the Korean situation, and, perhaps even more fundamental, a renewed realization on the part of consumers of the real value of coal as a fuel and of the need for having a healthy coal industry.

Thus, the evidence mounts that coal still has a real opportunity in spite of competitive and other troubles. More-significant, however, from the standpoint of solid gains for the longer-term future, are the steps now being taken on the production, marketing and labor fronts to put coal in a better position to discharge its responsibilities not only to fuel users and the Nation, but also to its own employees and investors. Practically every day, in fact, brings added confirmation of the conclusion that 1950 is producing more significant progress in mining, marketing and labor relations than any other period in history. Among the very-recent examples are:

1. A new anthracite promotional and research program announced July 11. For improving anthracite service and carrying the anthracite message to homes and industry, the planned ex-

penditure in the next 12 months is \$3,000,000—an all-time record.

2. Initiation of steps toward rebuilding the stoker market at a meeting of the principal producers of bituminous stoker coal at Cincinnati July 14. A major aim, naturally, is promoting the sale of stokers themselves, thus establishing the market.

3. Organization of the Bituminous Coal Operators' Association at a meeting at Pittsburgh July 11. This marks a major step forward in the establishment of better relations between operators, the union and mine employees by providing a better bargaining set-up and a means of working continuously to reduce production losses and cost increases resulting from strikes and slowdowns.

4. Development of a new unit for improving transportation behind loading machines and continuous miners. This new "piggyback conveyor," described elsewhere in this issue, already has demonstrated its ability to achieve a major increase in tons per man and consequently a major reduction in coal cost. It is only one of a number of new machines that promise major increases in efficiency in mining and preparation.

Marketing and production men and manufacturers all are playing a part in these new developments. This is a further heartening sign, since it is only by the efforts of all concerned that the maximum in progress can be achieved. Now, with coal's horizons beginning to open out again, there is added reason for bearing down on all the things that mean a healthier, more-profitable coal-mining industry. With the Nation now committed to a major defense effort, which may increase and certainly will continue for some time to come, a healthy coal industry becomes even more vital as a No. 1 security measure.



Wide World

CHECKING RUSSIA IN ASIA—or anywhere else—calls for men and machines in the battle lines and at home. Coal miners, operators and the industry's properties and machines stand ready again to serve the nation's needs.

Korea and Coal

Here Are Five Questions on Coal and the Conflict With Communism:

Where Does Korea Lead?

Can Our Economy Take It?

Are There Any Guideposts for Coal Men?

Can Coal Take on a Bigger Load?

What Does Coal Need?

KOREA SPELLS TROUBLE, any way you figure it.

For the nation's over-all economy, Korea adds new upward pressure when production in most industries already is bumping against the ceiling. For coal, it could bring a return to the conditions that prevailed in 1944 and 1945—swelling demand for basic energy coupled with railroad-car shortages and a tight market in mining equipment and production materials, plus a good chance for controls.

But there's no need for panic, in coal or in other industries. The smart coal producers will keep one eye on Washington for clues about what's ahead and the other eye on

their operations. They'll blueprint action for every likely degree of military involvement and thus be ready to take on whatever added load events may dictate. But they'll hold their plans on the drawing board until Washington gives a signal to plunge ahead.

Where Does Korea Lead?

With Korea, the United States crossed the threshold from cold war into police action. The final step, if Russia wants it that way, could be World War III.

Washington is hoping for the best—that our show of determination will convince Stalin that it's

time to halt. But whether Stalin pulls back or moves ahead, Korea shows the folly of making worldwide promises without building the strength to back them up. Now we know it's not enough to be right. We've got to be right and strong.

From now on, whether the Communists back down or force the issue, we'll put more men under arms and build more war tools. How much more depends on whether Korea (1) remains a "local incident," (2) becomes the lead-off punch in a series of local outbreaks ringing the world, or (3) marks the start of World War III.

If the best happens—that is, if shooting doesn't spread beyond Korea—the outlines of "Coal's Brighter Side," the article beginning on p 64 of this issue, will hold up pretty well. Coal producers may have to worry along with a little less steel and other materials, fewer new machines and stepped-up taxes. A few young miners may volunteer or be drafted. These would be annoying troubles.

But if it becomes clear that the Kremlin intends to strike at other weak spots—Formosa, the Philippines, Indo-China, Iran, Yugoslavia or Germany—thus forcing us to send men and arms to police several fronts at once, or if the Reds decide that now is the time for an all-out shooting showdown with the free nations, there's real trouble ahead for everybody, including coal. Either of these two developments would bring the following:

Rationed materials.

Controlled production and distribution.

Price freezes.

Wage ceilings.

Job freezes.

Vastly higher taxes.

At press time, Washington had not gone all out. The President asked Congress (1) to authorize priorities, allocation of strategic materials, and control of credit and speculation and (2) to remove armed-forces ceilings. He ordered call-up of National Guard and reservists "as may be required."

Mr. Truman asked for \$10 billion, plus money to arm Atlantic nations. The money will come mostly from higher taxes to prevent inflation and profiteering.

Though caution ruled, planners watched every Soviet action for clues that would give away the next move. In short, Washington was setting the pattern it urged upon industry, business and housewives—no panic buying, no sudden plunge, no hysteria; but watchful waiting, carefully studied moves, appraisal of resources, blueprints geared to every degree of emergency, and readiness for whatever might come.

Can Our Economy Take It?

Washington's air of studied calm can't hide the fact that a big step-up in military spending will bring tight controls. It will have to be that way because industry even now is straining to meet civilian demands.

It wasn't that way before World War II. Then, there was lots of slack in the economy. Steel was producing at 70 to 80% of capacity. Unemployment totaled about 9,000,000. Taxes were low and the national debt, though built up by the New Deal, still was manageable.

This time, steel has been running for over three months at more than 100% of capacity. Unemployment is less than 3,500,000 and most of the men without jobs are un-

skilled. Taxes are taking a 27% bite out of income, and the national debt, pushing against \$260 billion, is moving higher. Even electric power is touch-and-go in some areas, notably the Northwest and the TVA region, where atomic-energy plants draw heavily on facilities.

That's not to say we're in a bad way industrially. The fact is, we're much stronger than before World War II. Since 1939, steel has added 19,000,000 tons to capacity for a total of 100,000,000 tons; electric utilities, 22,500,000 kw for a total capacity of 62,700,000 kw. In most plants, postwar installation of new machines has boosted efficiency per man-day far above 1939 levels. With a lengthened work week, output could be stepped up considerably.

The catch is that civilian demands have kept up with plant expansion and, in some instances, even outstripped new capacity. That means there's not much room to wedge military purchases into the economy without whittling down the supply of non-military goods.

Most economists seem to think an extra \$2 to \$3 billion on top of the present \$13 billion military budget could be squeezed in without great danger. But President Truman already has asked for \$10 billion. That's enough to start competition between military and civilian buying. And that's why the President asked for some controls. If it takes more than we now expect to push the Reds back to the 38th parallel, controls will get tougher.

In other words, shortages and controls will grow in direct proportion to military needs and they'll last as long as Russia maintains pressure. As the pressure mounts—if it does—steel, copper and aluminum will be harder to come by and will cost more. Mine cars, mining machines, track, cable, rubber belting and other materials will be in shorter supply. And if we're drawn into mass land, air and sea fighting, manpower will become a serious problem, if not in the mines then at least in the plants that supply the mines with machines and materials.

Are There Guideposts for Coal?

No one yet knows how far we'll have to go to settle accounts with the Kremlin. But coal men can make sound guesses about what's

ahead for them if they stay on top of the news and read between the lines.

There'll be plenty of straws in the wind—the tide of battle in Korea, growing agitation in areas where Communism threatens, the progress of the draft, the size of Congressional appropriations, the number of plant conversions and the reactivation of standby plants left over from World War II. Keeping posted on these and similar matters will give coal men the tip-off on what's ahead and thus will help them shape their plans for machines, materials, manpower and production.

Can Coal Take on a Bigger Load?

The answer is "Yes."

Far from being a sick industry, coal is in good shape. Thanks to 10 yr of good business, enterprising management and an investment of some \$700,000,000 in new deep properties since 1946, the industry's mines, anthracite and bituminous, are modern and efficient. Capacity is adequate for all conceivable demands—bituminous, close to 700,000,000 tons; anthracite, 60,000,000 tons. Both industries are equipped with modern preparation plants that produce special-purpose fuels for industry and a variety of quality coals for home and commercial uses.

In addition, there's no fifth column in the coal mines. Miners are loyal and patriotic citizens.

What Does Coal Need?

To do its job, coal needs no more than the following:

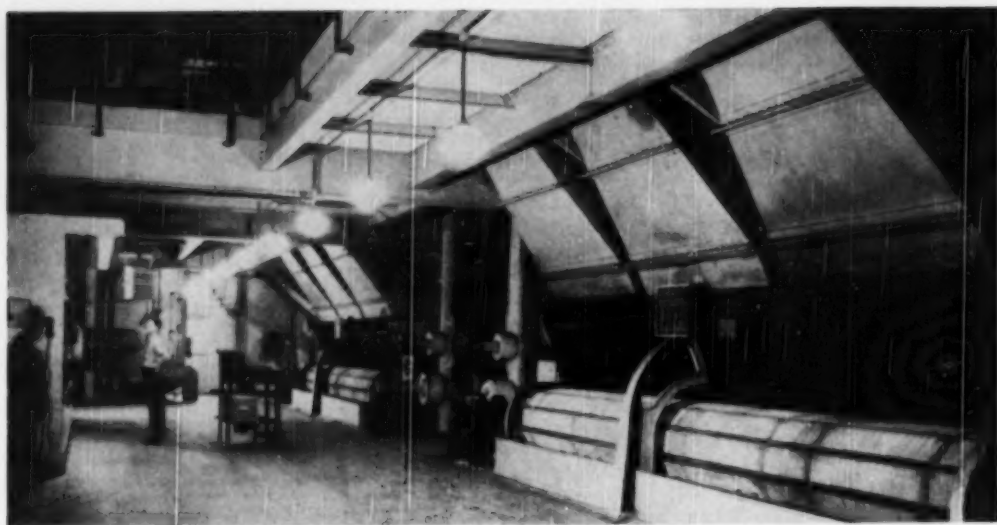
1. Fair treatment in Washington, including freedom from federal commissars and needless red tape.

2. An understanding of coal's basic importance and its needs, and a fair share of materials commensurate with its contribution to the nation's strength.

3. Freedom for operators and miners to work out their own agreements without threat of government interference.

4. A fair profit that will guarantee replacement of worked-out mines and worn-out equipment.

Coal is the only fuel that can care of its present customers, take on added military demands and relieve other fuels of part of their load while they, too, go to war. Coal never has failed the nation in time of need. It will not fail this time.



BIGGER INDUSTRIAL MARKETS are one of anthracite's goals. Anthracite reclaimed from culm banks provides cheap, efficient fuel for this big central station, the Jannison plant of New York State Gas & Electric Corp., Binghamton, N. Y.

Coal's Brighter Side

**What Coal's Critics Predict
Why the Mourners Are Wrong
Where Coal's Strength Lies
How Coal Is Moving Forward**

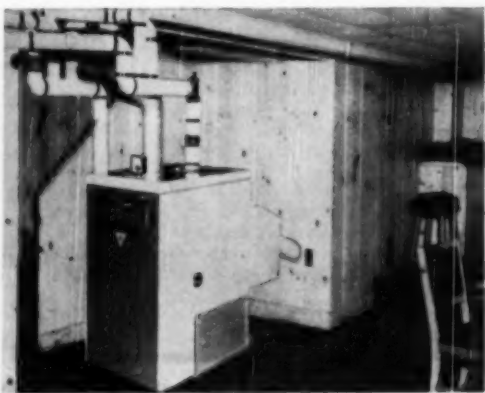
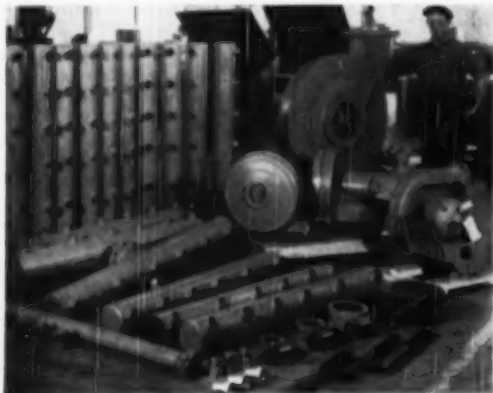
THE COAL-MINING INDUSTRY, bituminous and anthracite, and the men who produce quality coal at reasonable cost, will be in business

for a long time to come. The industry and the men who run it will thrive and, in thriving, will strengthen our nation's security

and welfare in the years ahead.

The prophets of doom don't see coal's future that way. In their view, coal is running a poor third to oil and natural gas. They speak their piece so often and with such self-assurance that even some coal men have joined them on the mourners' bench.

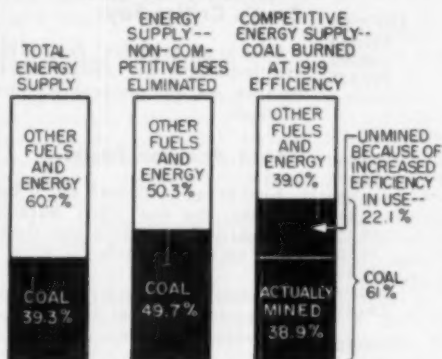
But the truth is that the calamity howlers, inside and outside the industry, don't look at both sides of



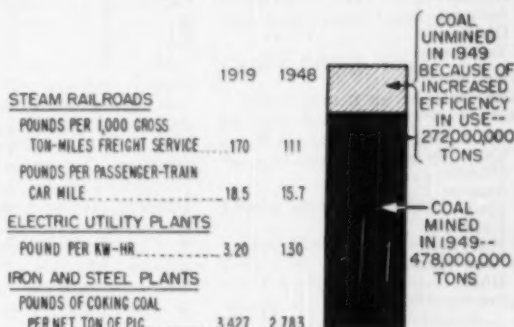
RESEARCH MAKES COAL a better fuel for industry and home. Over-fire air jets (left) help burn bituminous efficiently and smokelessly in big plants and locomotives. New basement burner warms anthracite homes economically and without trouble.

WHAT THE 1949 COAL PICTURE SHOWS

HOW COAL STANDS IN THE REAL COMPETITIVE MARKET



HOW BURNING-EFFICIENCY CHANGES AFFECTED COAL PRODUCTION



TRUE COMPETITIVE PICTURE emerges when non-competitive uses—motor fuel, lubricants, and natural gas used for carbon black—are eliminated from total energy supply. Without improved burning efficiency, coal needs would be much higher.

the coin. They hold up to view only what they see—the dark and gloomy side.

Is the dark side as black as the critics say it is?

The answer is "No." With a little rubbing down, the tarnish comes off, true outlines come to light and the scars smooth out.

Here's what coal's critics are saying, and here are the facts:

Coal's Critics Say:

Coal production was down in 1949—anthracite, 43,100,000 tons; bituminous, 435,000,000 tons. That's very bad.



NEW FURNACE DESIGNS make bituminous a better home fuel.

These Are the Facts:

Anthracite production in the three years 1946-48 averaged about 6,000,000 tons above the average for the 10-yr period of 1931-40. Even if the 1949 tonnage is added in, the average since 1946 still is 2,000,000 tons better than in the prewar decade. Output now, at midsummer, 1950, is running ahead of 1949 and the industry should wind up the year with about 50,000,000 tons.

On the bituminous side also, the dark spots brighten up a good deal. Although 435,000,000 tons in 1949 made a poor year by wartime and postwar standards, production last year still was 51,000,000 tons higher than the average for 1931-40 and topped output in seven of the individual years in that period. The average for the four postwar years, 1946-49, is 164,000,000 tons above the average for 1931-40.

Besides, bituminous users really burned more coal than was produced in 1949. Cut off from normal supplies by short work weeks and full-fledged stoppages, they took some 40,000,000 tons out of stockpiles to keep going and actually burned about 475,000,000 tons.

With an even break in weather, sustained industrial activity and a fair stretch of labor peace, bituminous production at the end of 1950 will total around 500,000,000

tons. Broken down, the figures look like this:

	1949 (Million tons)	1950 (Million tons)
Electric power utilities	84,072	90,000
Steel and rolling mills	7,451	8,000
Coke ovens	91,281	95,000
Railroads (Class I)	66,123	50,000
Cement mills	7,940	8,500
Other industrials	98,957	95,000
Retail dealer deliveries	90,299	95,000
Exports	27,852	20,000
Replacement of stocks		40,000
TOTAL	472,620	501,500

Coal's Critics Say:

Coal's share in energy output is down and the downward movement will pick up speed.

These Are the Facts:

To nail down their argument that coal is skidding fast, the industry's critics cite the Bureau of Mines chart of energy produced by various fuels and waterpower.

That chart doesn't tell the whole story. It adds into total energy certain areas of great growth in which coal has no real stake either now or in the near future, such as energy produced by gasoline burned in automobiles and trucks;

Bright Spot—New Capacity Exceeds Capacity of Mines Closed in 1950

These Mines Closed in the First Six Months, 1950

	100 to 200 tpd	200 to 500 tpd	500 to 1,000 tpd	More Than 1,000 tpd	Total Mines Closed	Tons Produced, 1948
Coal exhausted						
Illinois .....	..	..	2	2	4	1,317,591
Indiana .....	..	..	..	1	1	244,829
Ohio .....	..	..	2	1	3	510,397
Tennessee .....	..	..	..	1	1	187,136
Weak market, high cost and other reasons						
Alabama	2	2	..	2	6	969,903
Colorado .....	..	..	..	1	1	272,873
Illinois	7	8	1	..	16	904,069
Kansas	1	..	..	..	1	9,846
Iowa .....	..	..	1	..	1	159,372
Kentucky .....	..	..	1	..	1	77,360
Maryland .....	..	..	2	1	3	462,563
New Mexico	1	..	..	1	2	380,000
Ohio	2	1	1	..	4	236,817
Pennsylvania						
bituminous	14	11	7	1	33	2,040,130
Virginia .....	..	..	..	1	1	185,499
West Virginia	18	6	2	1	27	1,518,157
Total	45	28	19	13	105	9,476,542

These Mines Opened or Were Placed in Development
First Six Months, 1950

	100 to 200 tpd	200 to 500 tpd	500 to 1,000 tpd	More Than 1,000 tpd	Total Mines	Total Annual Capacity
Colorado .....	..	..	..	1	1	220,000
Illinois .....	..	..	..	3	3	6,270,000
Indiana .....	..	..	1	1	2	539,000
Kentucky .....	..	..	4	4	8	1,727,000
Ohio	2	2	1	4	9	2,266,000
Pennsylvania						
bituminous	8	3	1	..	12	655,000
Tennessee .....	..	1	..	1	2	495,000
Virginia	1	..	2	1	4	560,000
West Virginia	5	3	..	2	10	2,283,000
Total	16	9	9	17	51	15,050,000

Source: Survey by *Kennecott Coal Buyers' Manual*, based on latest available data from state mining departments, operators' associations and coal-carrying railroads

new energy uses, particularly in chemical and processing industries in which gas is the only usable fuel; and hydroelectric power generated in districts far removed from major coal fields, to mention only three.

Take gasoline motor fuel, for instance. In 1920, total runs of crude petroleum to stills was 437,068,000 bbl. From this crude, gasoline output was 116,251,000 bbl, or only 26.5% of total products. By 1930, gasoline production had risen to 432,241,000 bbl, a little over 44% of the total products from crude. In 1949, gasoline production stood at 961,791,000 bbl, 49.4% of a total of 1,945,519,000 bbl of crude run to stills. That's an increase of 728% in gasoline production since 1920. Meanwhile, total energy produced by mineral

fuels in the United States increased from 21,489 trillion Btu in 1920 to an estimated 35,000 trillion Btu in 1949—a rise of a little over 63%.

In this market—gasoline motor fuel—coal hasn't been displaced. Coal never was in it. Much the same can be said of the growth of natural-gas and hydroelectric-power markets. There are many of them that coal never entered.

The oil and gas industries will keep on growing. There's nothing wrong with that. But coal will grow, too. If these basic fuel industries don't grow, there'll be no way to provide more people with the goods, services and higher living standards they'll want.

Coal will have to share the energy load because oil and gas can't carry it all. That's why George H.

Love, president, Pittsburgh Consolidation Coal Co., recently predicted that between now and 1965, oil use will increase 30%; gas use, 60%; and coal use, 33%.

Coal's Critics Say:

Coal is an inefficient fuel. Modern industries are discarding it because oil and natural gas are efficient.

These Are the Facts:

Coal is not inefficient, but it has to take the rap when burning equipment is outdated and inefficient, as some of it is.

Burned with modern methods and equipment, coal is on a par with other fuels and, in some instances, even more efficient. Not long ago, the Federal Power Commission, after surveying 200 steam plants generating electricity, reported that 28 plants burning natural gas exclusively used 7.95% more Btu's than the 101 coal-fired plants and that 11 plants burning oil exclusively used 2.45% more Btu's than the coal plants. The thermal efficiencies of the coal-fired plants averaged 24%; natural-gas plants, 22.2%; oil plants, 23.4%.

Over the years, progressive industries have made steady progress in their use of coal. Spot the years 1919 and 1948, for example. Since 1919, three big bituminous customers—railroads, electric utilities and iron and steel—have improved their coal-burning efficiency. If these three industries in 1949 had burned coal at 1919 efficiencies, their consumption would have been as follows:

	Tons
Railroads	102,000,000
Electric utilities	207,000,000
Iron and steel	122,000,000
TOTAL	431,000,000

Thus the total for only three big coal customers, if they had made no progress in 30 yr, would have approximated the industry's entire output in 1949. Consumption by all of coal's customers would have been about 750,000,000 tons.

The coal industry isn't crying over tonnage lost to efficiency. As stated earlier, advances in mining, preparation and burning methods have kept coal strong. The industry's leaders are justly proud of the sizable share they have had in getting more useful work from the Btu's in every ton of coal.

Coal's Critics Say:

The swing to other fuels in 1949 and 1950 looks bad. It's a speed-up in the long-term swing away from coal and the beginning of coal's end.

These Are the Facts:

The critics who noise this abroad are mistaking a temporary backset for a death rattle. The backset was brought on by a delayed but inescapable postwar adjustment and was complicated by work stoppages, consequent shortages in supply and a river of foreign oil imports.

Granted, some customers switched to oil and natural gas when coal stocks reached danger levels early in the year and foreign oil flooded markets on the eastern seaboard. But the customers who burned coal for good reasons of cost and efficiency in 1948 and early 1949 will return to coal for the same good reasons when supplies are adequate and uninterrupted, and when price is competitive.

But if coal has its troubles, oil and natural gas have their problems, too.

Passing over the question of proved petroleum reserves, now calculated to last only some 12 yr at present consumption rates, analysts see some troubles even closer at hand. Some oil-industry leaders have serious misgivings about their increasing load of domestic- and diesel-fuel users. Privately, they voice the fear that they can't keep up with growing demands or that if they do keep up, they will have to curb profitable gasoline production and draw their profits from light and diesel fuels. In that event, the price of domestic and diesel fuels easily could rise to the level of gasoline, less excise taxes. That's a real threat to a big block of oil customers.

If the cold war warms up and the Department of Defense asks for more oil, gasoline and aviation fuel, oilburning householders and diesel-fuel users will be caught in a cold squeeze. At the moment, oil imports are helping keep the gap closed between supply and demand. But in any national emergency, domestic oil producers and refiners would be hard pressed.

There's an even darker shadow on the long-term future of domestic oil, as well as coal. Here's the situation: As long as imports of

foreign oil continue at present high rates, the residual-fuel market will be flooded, since foreign petroleum produces more residual oil than domestic petroleum. A flooded market forces prices down, cuts the profits of domestic producers and thus curtails investment in exploration and development of new oil fields and construction of new refinery capacity within the United States. Cheap residual oil also tempts customers away from coal, thus cutting coal's profits, forcing a cut-back in the industry's capacity and slowing down investment in new properties and new preparation plants.

With the growth of coal and oil stunted by foreign-oil imports, any national emergency would catch the United States short of the productive capacity needed for defense.

The outlook for natural gas also is spotty. Granted, supplies appear to be adequate for the next 25 yr or so. Yet the industry's newly expanded and complex gathering and distribution systems never have been tested by a really rough winter. Though gas interests are blithely confident that the industry can keep on moving into more coal and oil markets, the Federal Power Commission has some doubts. That agency recently has turned down several applications for permission to build new pipelines, pointing out that the petitioners failed to show firm supplies equal to their promises to deliver.

Most natural-gas contracts with industrial customers provide for "interruptible" service. For a service or manufacturing plant far from gas fields and dependent upon pipelines with limited capacity, that's not a very secure basis for operations. Storage capacity to meet surges in demand is limited, and low-temperature storage, which would cut space requirements, is costly.

For gas customers, the price outlook isn't good either. The only way the price of gas can move is up. From now on, with rising costs for collecting and handling gas and with a scramble for supplies in the field, the upward trend will pick up speed. Contracts for delivery usually cover a 20-yr period, with an automatic mark-up every 5 yr. But many pipelines that have moved into large communities have asked for rate boosts shortly after starting deliveries. Their customers now are

paying the bill for cost estimates that were neither accurate nor profitable. Higher gas prices will send some of them back to coal.

These are some of the facts about oil and gas. They make it reasonable to believe that switchovers from coal to competing fuels may have passed their peak.

Coal's Critics Say:

The shakeout in the coal industry has been rough. There now are fewer companies and mines in the coal business than 2 yr ago.

These Are the Facts:

The shakeout hasn't knocked down any well-established company producing quality coal at a reasonable price. By and large, the casualties have been among (1) new, small companies and truckers that came into the industry to make a fast profit while old-line companies were stymied by strikes, (2) old mines that were close to exhaustion anyhow and therefore were not worth modernizing, (3) companies that failed to keep up with the march of progress in mechanical mining and preparation, and (4) high-cost and marginal properties that could show a profit in a seller's market but could not survive competitive pricing.

The survival of old-line companies is a measure of their real strength. Bolstered during and since the war by good business, fair profits, smart management and big investment in properties and machines, they are in good shape. For the kind of coal they produce—top quality, tailor-made to specifications—there will always be a strong market.

Coal's Critics Say:

Coal's retail market has gone to pot. People don't want to burn coal in their homes.

These Are the Facts:

Coal is doing pretty well anyhow. Retail deliveries of bituminous in 1949 totaled 90,299,000 tons, over half a million tons higher than in 1948. Thus far in 1950, retail deliveries are running about 10% ahead of 1949. That doesn't sound like a funeral wake.

The fact is, there still are lots of homes that burn coal. The best recent estimate, made at the end

Bright Spots—Retail Sales Are Up, Industrial Uses Will Grow

of 1949, is that over 54% of all dwellings in the nation were burning coal; gas, about 16%; oil, some 25%; and wood or other fuel, around 4%. In the anthracite market area, the figures are estimated to be about 53% coal, 5% gas and 37% oil.

These data are more than cold statistics. They are money in the bank for those anthracite and bituminous retailers who go out to get the business and for those producers who provide them with good coal at a fair price. Proving this point, several bituminous dealers at retailers' meetings this spring reported sales increases ranging from 75 up to 300% for 1949-50 over 1948-49. For them, business is good.

The fact is, the coal retailer now doesn't have to fight his battles alone. The producer and the shipper are holding out a helping hand to him.

To help the bituminous dealer merchandise coal, Coal Heating Service offers a plan, now working in nearly 80 cities and communities, to improve coal service and add space and sparkle to coal advertising. In addition, Bituminous Coal Research, Inc., provides him with strong selling aids—stoves, space heaters and furnaces that make coal smokeless, economical and trouble-free.

On the anthracite side, producers have added new punch to their dealer schools and their clinics for coal and equipment salesmen and the Anthracite Institute, like BCR, has developed new home-heating equipment, automatic and handfired, to make anthracite a more attractive and economical fuel for home use.

Coal's Critics Say:

Electric-utility use of coal dropped from 99,586,341 tons in 1948 to 84,071,523 tons in 1949. The drop will continue.

These Are the Facts:

The utilities burned 200,000 tons more in April, 1950, the first month of full operation following the new wage agreement, than in April, 1949, and built up their stockpiles from 100 days' supply on April 1, 1950, to 118 days' supply on May 1, 1950.

The upturn in April reflects the thinking of most electric-utility men. They argue that in the long run coal must be the basic fuel

for generating electric power. For example, a ranking official of a big utility company on the Atlantic coast, where dumped foreign oil recently has flooded the market, said in May that even if oil under-sells coal, his company never will make less than 40% of its power from coal and that, when price is right, coal use will run much higher.

In stating this policy, he pointed out that: (1) his company has storage capacity for only 20,000,000 gal of oil—about four days' supply; (2) coal is easier, cheaper and safer to store in large quantities; (3) oil stocks are more easily sabotaged than coal stocks; (4) though labor troubles interrupt regular coal supplies from time to time, a national emergency would expose coastwise tankers to submarine attack and the Department of Defense probably would order power plants to curtail or even cut off oil use; (5) with the right kind of equipment, coal is cleaner than oil and smokes less; and (6) over the long haul, coal is cheaper than oil.

In the Midwest, similar thinking is guiding the policy of Commonwealth Edison Co., Chicago. Charles Y. Freeman, board chairman of that company, told stockholders in May that the company would increase its stockpile of coal from 80 to 120 days' supply in the near future. This big stockpile is needed, he explained, because the company has had to spend over \$8,000,000 since 1946 for poor-quality coal at high prices in distant markets, use high cost substitute fuels and resort to other expedients to stretch scarce supplies of coal. "Ninety percent of our fuel is coal because it is the cheapest and best for our needs. . . . We also are equipped to burn gas but we burn it only during the limited periods in which it is available. We also have some oil-burning equipment which we use in emergencies, such as during the last coal strike. For ordinary use, the cost of oil in our plants is prohibitive as compared with the cost of coal," he reported.

Elsewhere, in Detroit, a top official of Detroit Edison Co. recently stated that coal generates more than 99% of his company's electricity. "Coal is the cheapest fuel Detroit Edison can use for generating electricity. That's why we use it."

These facts and others like them point to a strong utilities market for coal in the years ahead pro-

vided supplies are adequate and uninterrupted and competition is fair. Utility experts predict that electric power capacity will increase up to 50% in the next decade. That will take a big chunk of coal.

Coal's Critics Say:

The diesel is taking over the railroads. Coal's locomotive market soon will shrink to nearly nothing.

These Are the Facts:

Coal's critics are half right. Mostly because of the diesel, railroad use of coal dropped from 110,166,000 tons in 1946 to 68,123,000 tons in 1949. That does look bad, and the trend probably will continue for several years, though at a slower rate. Admittedly, the diesel is cheaper and its thermal efficiency is higher. But the diesel boosters make coal look worse than it really is. They contrast a shiny new diesel with a 20-year-old steamer. That way, the diesel is an odd-on favorite.

But give the coal steamer an even break. Make the comparison between the diesel and a new high-powered steam locomotive. In the last several years, research men and locomotive builders have worked big changes in locomotive design and performance. In their own shops, some railroads, like the Norfolk & Western and the Chesapeake & Ohio, to mention only two, have played a strong hand in these advances. BCR also, along with affiliated research institutions, has boosted steam-locomotive performance with newly developed smoke-consuming devices, improved air distribution and combustion, and reduction of cinders.

Compared on these terms—diesel vs new coal-burning steamer—the picture looks a lot better for coal. That's why the Norfolk & Western Ry. launched a new steam-locomotive building program in 1948. Since then, 25 new heavy-duty freight locomotives have been built and put in service, and seven more now are under construction. In June, this railroad put on the first of three new streamlined passenger locomotives which, at normal speeds of 40 to 60 mph, develop more tractive power than the giant 6,000-hp diesel.

Thus it's fair to say that coal-burning steamers will provide a

steady market, though not so big as formerly, for a long time ahead.

Meanwhile, BCR's Locomotive Development Committee, supported by a group of railroads and coal companies, is moving toward the end of its job—a coal-fired gas-turbine locomotive with high thermal efficiency and with costs considerably lower than diesel costs. The prototype will be tested on the rails in 1951.

In the long run, both the diesel and the coal-fired gas-turbine locomotive may turn out to be only way stations on the road to complete electrification of railroading. Joint studies along this line now are under way by railroads, electric utilities, railroad equipment and manufacturing companies, and the coal industry. Suppose these studies show that electrification is practicable. Coal then, instead of being burned under locomotive boilers or in a gas-turbine locomotive, will find a bigger utilities market and thus indirectly will recapture a big share of its railroad market.

Coal's Critics Say:

Manufacturing, processing and service industries are turning away from coal in droves. Coal can't stem the tide or win them back. Coal is too backward to move forward.

These Are the Facts:

Again, the mourners are partly right. Bituminous use by industries—cement mills, steel and rolling mills, coke ovens and others—at the end of April, 1950, was about 13% below consumption in the same period of 1949.

But take into account the fact that for much of the first four months of 1950, coal mines were shut down or on short working time. With these conditions, a drop of 13% in the four-month total doesn't look so bad.

Coal's critics forget that whenever other industries are busy, mines also are busy if allowed to work. It takes coal to make cement, run iron and brass foundries, fabricate pipe for pipelines, drive assembly lines, manufacture refrigerators and washing machines, and build diesel locomotives. That's why the coal business will be good as long as our economy thrives.

Our economy is thriving now. Here are some of the factors that

show how well it is going:

1. The *Business Week* index of business and industrial activity on June 17, 1950, stood at 214.1 against 181.9 a year earlier.

2. Steel-ingot operations on June 24, 1950, were running at 101.2% of capacity against 84.4% a year earlier.

3. Automobile output for the week ended June 17, 1950, totaled 203,689 units, about 57,000 above the corresponding week in 1949.

4. The daily average of engineering construction awards for the week ended June 17, 1950, was \$42,035,000 against \$31,097,000 in the same week, 1949.

5. Electric power output for the week ended June 17, 1950, was

6,012,000,000 kw-hr, about 650,000 more than in the same week, 1949.

6. Employment in July, 1950, was expected to hit 62,000,000, about 300,000 ahead of record-breaking 1948.

7. Population now is over 150,000,000 and growing fast, at the rate of 2,000,000 per year.

8. National income, at latest report, was at the rate of \$212,800,000,000 per year.

9. Home building is booming, with \$825,000,000 worth of new dwellings put in place in May, 1950, 60% above May, 1949.

These figures and others like them show that the trend is upward. Coal can't avoid moving along with the trend.

How Coal Is Moving Forward

Coal-industry leaders aren't satisfied to drift with the stream. Here are some of the things the front-line men are doing to put themselves out front in the industrial-fuels market:

1. Investing big sums in new properties, machines and equipment to streamline coal production and cut costs. At the end of the first five years following the merger of several companies in 1945, for instance, Pittsburgh Consolidation Coal Co. will have spent \$75,000,000 adding to reserves, building modern plants and equipping mines with the newest equipment. The company will have earned about \$65,000,000 in that same period.

2. Building costly new preparation plants that deliver better coal to meet customers' needs. Best estimate is that 602 plants were in operation or under construction in 1949, against 502 reported in 1948. One operator in March, 1950, stated his company's policy this way: "You can't just dig it and sell it. It must be clean to find a market. We're figuring on doubling the capacity of the cleaning plant at one mine this year. This will cost us about \$300,000. By the end of next year, we plan to build a new cleaning plant at another mine at a cost of \$750,000."

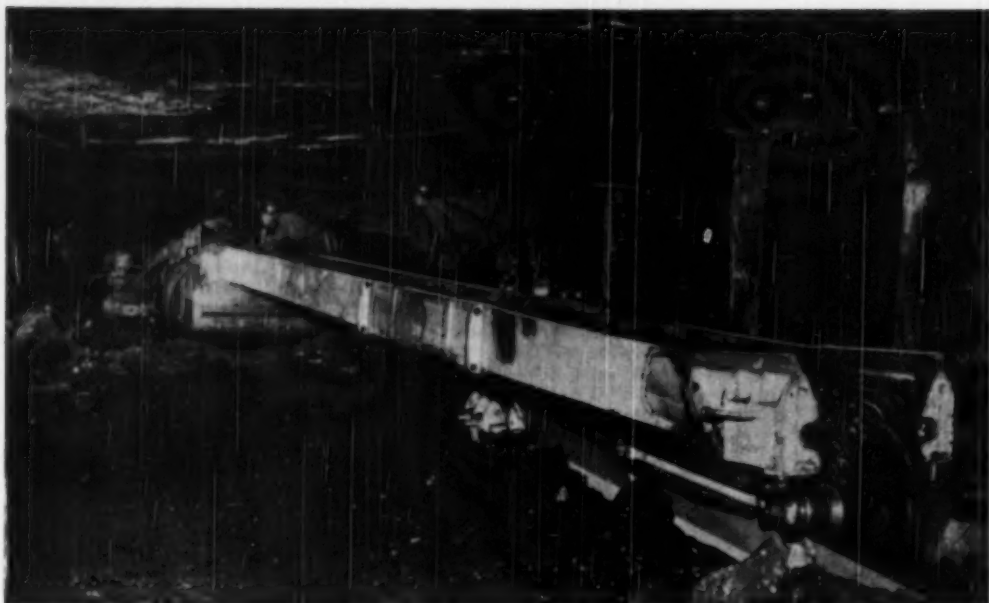
3. Finding new industrial uses for anthracite and the byproducts of mining as follows: Mixing anthracite with bituminous in cities where air-purification laws are strict; burning anthracite on

farms to speed curing and preserve the nutritional values of certain cured foods; making producer gas from rice and buck; developing burning equipment aimed at bigger markets in commercial plants.

4. Making bituminous more attractive for industrial and commercial use as follows: Developing an automatic "package" boiler producing 15,000 to 20,000 lb of steam; devising ways to prevent smoke and handle coal and ash; and improving stoker performance, pulverized-coal feeding and air distribution.

In fact, the outlook is really pretty good. The two-year wage agreement between operators and the union and increasing efforts by individual operators to make friends of their miners promise improvements on the labor front. Producers and supervisors down the line are using new machines and methods to mine better coal at lower cost. The shakeout among marginal and high-cost mines is cutting overcapacity down, and Bituminous Coal Institute and the Anthracite Institute, together with individual operators working on their home grounds, gradually are building public favor for coal.

Those are facts that coal men can be optimistic about. But they can't afford complacency. The industry—bituminous and anthracite—must keep building its strength on all fronts. That means spending money, working hard and thinking far ahead. For those who go after it this way, business will be good.



CONTINUOUS-LOADING ATTACHMENT IN ACTION. With the loader in the center of the room, range forward and backward is 17½ ft.

Bridge Conveyor Makes

Crichton-Pioneered Attachment . . .

1. Connects Loader and Conveyor
2. Makes Loading Continuous
3. Has Doubled Tons per Man

By J. H. EDWARDS
Associate Editor, Coal Age

"WE HAVE HIT PEAKS of 45 tons per man-shift compared to the old average of 10 tons." Thus A. B. Crichton, Jr., mining engineer, of Johnstown, Pa., recently summed up initial experience with a new "continuous-loading" unit for use behind a standard crawler loader at the Crichton No. 4 mine, at Nettie, Nicholas County, W. Va.

"Peaks, of course, do not tell the whole story," Mr. Crichton continued, "but do indicate the possibilities." Recently advanced to the post of vice president in charge of operations for the Johnstown Coal & Coke Co., which operates Crichton No. 4 and other mines in Pennsylvania and West Virginia, Mr. Crichton has been a leader in

the development of new methods and new equipment, including the "Crichton" flexible-shaft-driven coal and rock drill.

• **Tons per Man Doubled**—Two weeks before the preceding conversation with Mr. Crichton, the writer watched the new continuous-loading unit in operation and took the accompanying photographs. At that time, in spite of the delays encountered in working out a few bugs, W. H. Seelinger, superintendent at Crichton No. 4, reported that the average productivity was 22 tons per man-shift compared to the 10 tons formerly attained with the same loading machine working in the same section of the mine.

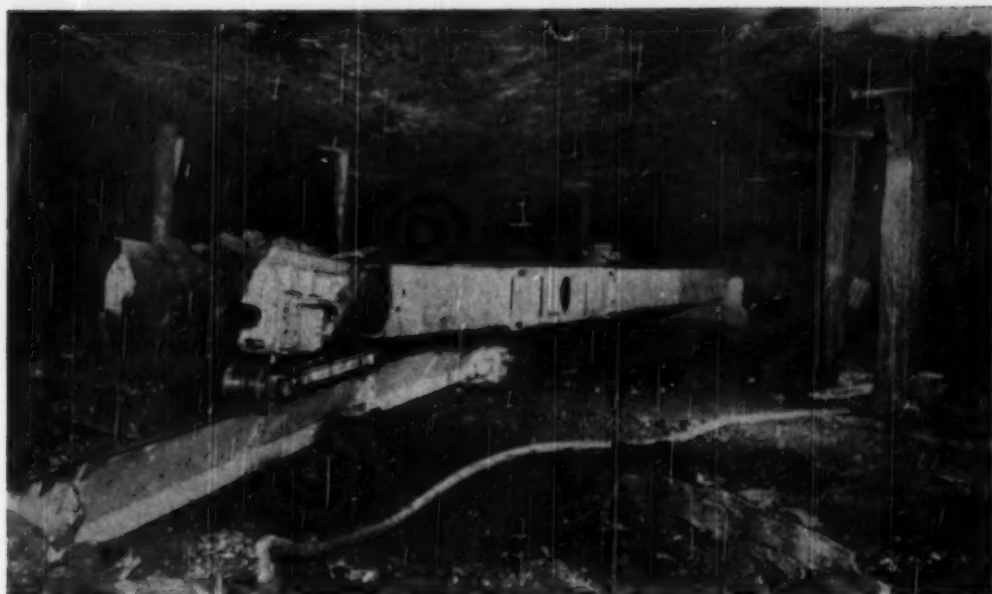
The Joy 12 BU unit in question previously worked four 30-ft rooms

and was served by two shuttle cars hauling to a belt-conveyor system extending all the way outside to the tippie. Now, the same loader, modified with a bobtailed rear conveyor and the continuous-loading attachment, and working in two 40-ft-wide rooms, each equipped with chain conveyor, is making records foretelling a possible revolution in methods of moving coal from loading machines and continuous miners.

Continuous-Loader Design And Application

Briefly, the continuous-loading attachment consists of a short portable chain conveyor, one end of which is suspended from the bobtailed rear conveyor of the loading machine and the other supported on wheels riding on top of a chain room conveyor. Without the conventional long rear conveyor needed for shuttle-car loading, tramping the loading machine from one room to another is easier and safer.

After the loading machine has entered the room and has picked



TONS PER MAN HAS BEEN DOUBLED in preliminary continuous-loading work. Here, the loader is working behind the posts at the right.

Loading Continuous

up the front end of the short intermediate conveyor, or continuous-loading attachment, the operator loads out the entire cut without looking back at the rear-conveyor discharge.

• **How the Idea Was Born**—Consciousness of the need for an immediate improvement in mining methods was the motivating force behind the development of the new continuous-loading attachment. In the search for such an improvement, Johnstown Coal & Coke officials, including Messrs. Crichton and Seelinger; R. D. Joseph, general superintendent of the West Virginia operations; and C. D. Reed, maintenance engineer, reached the conclusion that it was possible to hang one end of a short chain conveyor on the loading machine and have the other end ride freely on the top of the room conveyor.

Sketches and drawings were made and investigation prior to the purchase of room conveyors suitable for the project turned up the fact that the "Piggyback" conveyor, a new development of the Long Super Mine Car Co., Fayette-

ville, W. Va., could be adapted to the job. A feature of the Long Piggyback unit is a method of pivoting the conveyor at the carriage or dolly to permit the discharge end to swing in an arc, thus maintaining proper discharge position for spillage avoidance even though no hopper or sideboards are used. Moreover, the Long room conveyor is built with rolled edges, making an ideal track for the wheels of the Piggyback unit.

• **Loader Adaptation**—Mr. Reed removed the regular rear conveyor from the 12 BU loader, built a special short rear conveyor fixed in a central position but retaining the raising and lowering feature, and then devised a special hitch for hanging the front end of the Piggyback unit to the new rear conveyor on the loader.

The hitch or hanger provides the flexibility necessary as the loading machine maneuvers over bottom with local dips. Only a few seconds are required to insert the two pins that permit the bobtailed rear conveyor on the loader to pick up the front end of

the Piggyback. The rear conveyor then is elevated so that the front end of the Piggyback unit, which contains an independent drive, clears the floor by 2 or 3 in. The motor is supplied with power through the 12 BU controller. Therefore, the Piggyback conveyor runs only when the loader gathering arms are in operation.

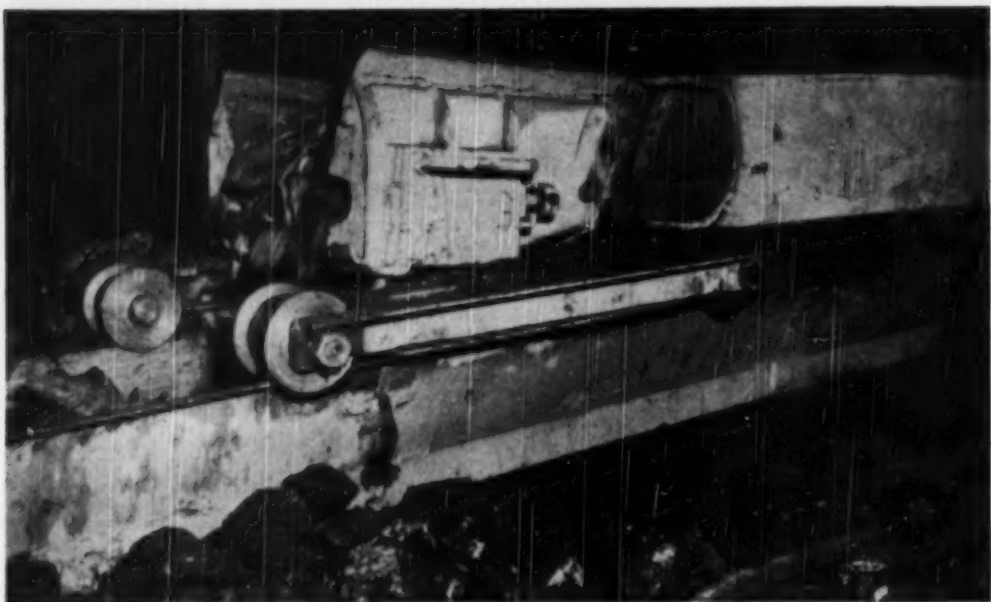
• **Operating Range**—Flexibility is a major feature of the unit. As Mr. Crichton puts it, "It can drive crosscuts to distances of 35 ft from the center line of the room. Think that over!"

The Piggyback conveyor can swing nearly 360 deg and the loading machine can swing more than 180 deg in relation to the front end of the Piggyback unit. The over-riding or telescoping range of the Piggyback is 17½ ft. That range could be increased by using a longer unit.

How Mining Is Conducted And the Results

Crichton No. 4 mine is a 3,000-ton two-shift ac-powered belt-conveyor operation in the Sewell seam. The new continuous-loading attachment normally operates in coal of average thickness—40 to

Mining With the Continuous-Loading Attachment at Crichton No. 4



CARRIAGE OR DOLLY END of the continuous-loading attachment, with the dolly riding on the rolled edges of the room conveyor. The attachment conveyor does not swing around a fixed pivot. Instead a slotted plate maintains proper discharge position.



OFFICIALS PARTICIPATING in the development of continuous mining include (left), A. B. Crichton Jr., mining engineer and vice president in charge of operations; W. H. Seelinger, superintendent, Crichton No. 4 mine; and C. D. Reed, maintenance engineer.

42 in—topped by 3 in of draw-slate, which is loaded out with the coal. Impurities are removed on the surface in a Kanawha-Belknap chloride washing plant.

The main top is excellent and the bottom is hard. The 40-ft rooms are driven on 50-ft center. Generally speaking, the seam is fairly level.

• **Continuous-Loading Set-up** — Equipment for the two-room continuous-loading unit comprises the following: one Goodman 512 short-

wall cutter equipped with bug-duster and operated at 40 in per min, one Joy T2 shortwall truck, one Crichton flexible-shaft coal drill driven from a power take-off added to the cutter (*Coal Age*, July, 1949), two Airdox breaking tubes, one 12 BU loader with the original rear conveyor replaced by an 8-ft-long unit, two Long Piggyback conveyors fitted with front-end hitches developed in the mine shop, and two Long chain-type room conveyors.

Only four men comprise the unit

crew. Panning-up of the room conveyor is done by the loader helper, assisted, when necessary, by the loading-machine operator.

The machinemen cut, drill, shoot and timber. Eleven Airdox holes are drilled per 40-ft room. At present, the face working time is 6½ hr. This will be increased in a few months when a new air shaft and portal equipped with an elevator go into service.

With Airdox breaking, the coal runs 65% over ¾-in round. There is no great amount of dust at the

face and sprays are not required.

● **Drill Contribution**—While the theme of this report is a new method of moving coal away from the loading machine, the Crichton flexible-shaft drill contributes decidedly to high production per man-shift. Three-inch holes 8 ft deep are drilled in 15 to 20 sec, compared to 5 to 7 min with a hand-held electric drill. The 11 holes per face are drilled in not over 6 min, instead of at least an hour.

This fast drilling, Airdox breaking and the bugduster-equipped cutter make it possible for the cutting-machine helper to spend time timbering and positioning the room-conveyor pans and chains ready for extension. The only so-called helper duty left for him to perform under the new set-up is setting the machine jacks. Now, he drills, shoots, timbers, moves conveyor chains, and so on.

Since the loader helper no longer has to spend much of his time shoveling up spillage from the rear conveyor, he also has time for other things and, as previously mentioned, takes care of panning up with the help of the machine operator.

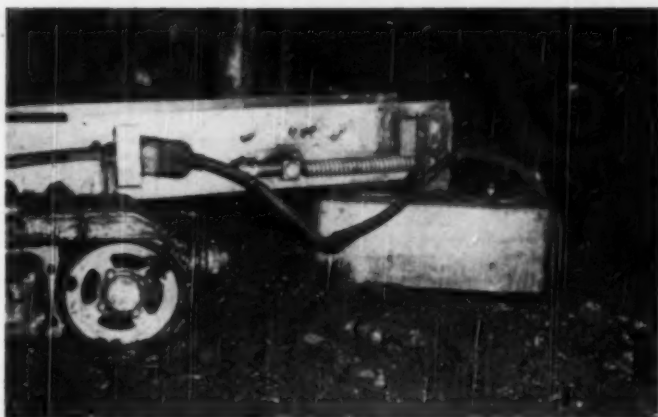
● **Continuous-Loading Results**—What has been achieved with the new continuous-loading unit and the revised set-up is perhaps best summarized by Mr. Seelinger, who has lived with the new unit, in his answers to questions put to him by *Coal Age*:

CA—Did you put the new unit into a section of the mine where the conditions are good, average or bad?

Mr. Seelinger—We put it in the best conditions. We figure that's the best way to try out a piece of experimental equipment to find out if it's any good. Get the bugs out of it under favorable conditions, then put it on the tougher jobs.

CA—Again, just what are the advantages of this new equipment?

Mr. Seelinger—As I've said, the work to date has been experimental but the average tonnage per man-shift has been more than doubled. Our immediate goal is 200 tons per shift—that is, 50 tons per man-shift. Compared to loading into shuttle cars, the investment in equipment is considerably less, maintenance will be very much less, the work is safer and, in low coal, it permits the use of crossbars.



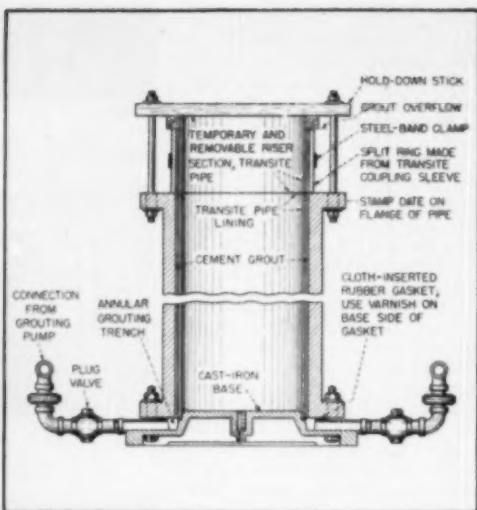
THE SPECIAL SHORT BOOM on the loader is fixed centrally but can be raised and lowered to pick up the front end of the attachment conveyor.



WITH THE LOADER BOOM at an angle of 80 deg to the attachment conveyor, center discharge still is maintained by movement of the pivot point.



THE ATTACHMENT CONVEYOR clears the floor by 2 to 3 in, pushing loose coal out of the way. The cable supplies power from the loader.



ASBESTOS-CEMENT LINERS, grouted into corroded cast-iron pipes, salvage these partly worn sections for further service. Grouting equipment (right), recently housed in a special building, permits fast economical pipe lining.

How Glen Alden Achieves Low Cost in . . .

Borehole Water Handling

- Worn Pipe Salvaged With Grouted-In Lining
- Boreholes Lined for Longer Service Life

By E. J. FALLOON, Hydraulic Engineer
Glen Alden Coal Co., Wilkes Barre, Pa.

CONTINUOUS RESEARCH by the Glen Alden Coal Co., Wilkes-Barre, Pa., on the problem of handling acid mine water has resulted in the development of efficient and economical methods and equipment

for (1) preventing corrosion in cast iron pipes by lining them with grouted-in asbestos-cement pipe, and (2) lining boreholes with the same material also grouted-in. The methods are described here.

How Cast-Iron Pipe Is Lined

USING a portland-cement-and-water grout to seal a Transite liner into a worn cast iron pipe section is one of the salvage techniques developed by Glen Alden engineers. In some instances, the walls of the cast-iron pipe have been badly pitted and as much as one-third of the original thickness has been worn away by the action of acid mine water.

Briefly, the process consists of cleaning the interior of the cast-iron pipe to remove loose or soft

material, inserting a Transite section into the cast-iron pipe to furnish a non-corrosive lining, and then forcing grout into the space between cast iron and Transite to bind them into a unit. This new pipe retains the remaining mechanical strength of the cast iron and receives the corrosion-resistance and additional strength of Transite.

Equipment developed by company engineers and built in Glen Alden's Exeter (Pa.) shop makes the process possible. The equipment con-

sists of a base to hold the cast iron and Transite in alignment, a shrink head to control grout at the top of the assembly and a pump to force grout between the two pipes. The base is made of cast iron. It is a disk surrounded by a circular trench which, in turn, is surrounded by a flange provided with bolt holes. The disk supports the Transite, the trench is a grout distributor and the bolting flange supports the cast-iron pipe.

The disk for supporting the Transite has a raised plate in the middle that centers the pipe on the disk. The diameter of this plate is the same as the inside diameter of the Transite. Actual support is provided by the exposed rim of the disk around the raised plate. The width of this rim is the same as the thickness of the Transite walls.

The cast-iron pipe rests on a cloth-inserted rubber gasket on the flange and the flange of the cast-iron pipe is bolted to the base flange through matching holes. Thus, the outer wall of the Transite is flush with the inner wall of the trench but the inner wall of the cast iron hangs well over the outer wall of the 1½-in-wide trench. This overhang compensates for varia-

tions in cast-iron thickness resulting from uneven corrosion. With the pipes secured to the base in this manner there is a grouting space of at least $\frac{1}{2}$ in all around between cast iron and Transite.

The shrink head is made of two split sections of Transite. Splitting permits easier removal of the head after the grout sets. A "hold-down stick" on top of this head is bolted to the upper flange of the cast-iron pipe to keep the head in position during grouting. The functions of the head are to prevent spill-over at the top and to provide extra grout for shrinkage that occurs when the grout between the pipes sets.

Cast-iron pipe, Transite liner, grouting base and shrink head are assembled with the pipes horizontal. Then, the assembly is raised vertically for grouting. The grout is a mixture of portland cement and water. A duplex plunger steam pump forces it through two lengths of flexible hose into the trench in the base and up into the space between the pipes. Access to the trench is through two 17/16-in cored ports on opposite sides of the base.

The surfaces to be grouted are wet thoroughly before grouting begins, and heavy grease is applied to all surfaces from which grout must be removed between grouting operations.

When the grout has completely set and hardened, the shrink head is removed and exposed end faces are rubbed to a smooth and even finish, flush with the cast-iron pipe flange faces. Carborundum rubbing stones are used.

Transite lining surpasses other types of liners that have been tried by the company, such as wood, hard and soft rubber, tar-base paints, and coatings and enamels. Wood

falls out of place when it dries and has a tendency to creep past pipe joints, making disassembly difficult; abrasives in the water chip or cut rubber linings; bituminous coatings tend to melt off in hot sunshine; and vitreous enamel chips easily.

Other methods of placing the Transite liner were tried before the accepted process was developed. In the first attempt the inside of the cast iron and the outside of a Transite section were turned to close tolerances. The Transite was then buttered with white lead and slipped into the cast-iron pipe. The method worked but it was time-consuming, and preparing the pipes to proper tolerances was too costly.

Lining Large Diameter Borehole

A BREAK in 1946 in cast-iron column lines in a Glen Alden hoisting shaft persuaded company officials to try large-diameter boreholes as a better means of bringing water to the surface. Since that time six boreholes have been drilled at three different collieries. The most recent is a 24-in-diameter 555-ft-deep hole at Truesdale colliery, near Wilkes-Barre. The hole is lined with 18-in-diameter 13-ft-long sections of class 100 Transite mine-service pipe. The space between liner and hole is filled with portland-cement-and-water grout.

Placing the lining in the hole was a major problem, but a special rig was designed that does the job successfully. The principal parts of the rig and their functions are:

1. A loop of 1-in wire rope lowers the Transite column into the hole, with new pipe sections being

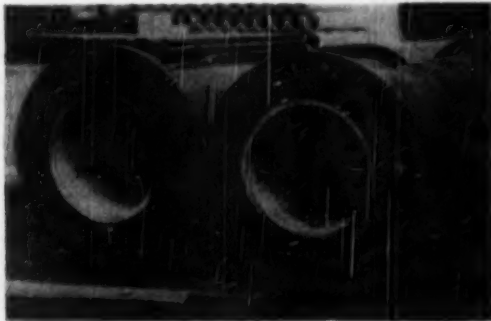
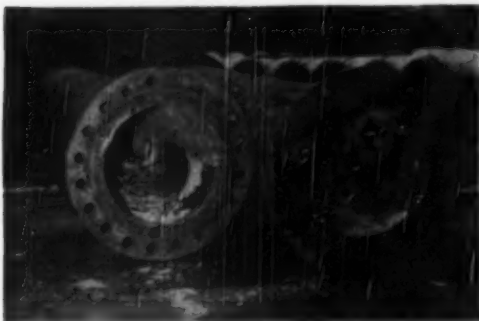
The next experiment was made with cast-iron pipes split lengthwise. One half was blocked in a horizontal position and the inside of this section was coated with grout. The Transite was laid in this cradle and the top of the Transite was coated with grout. Then the other half of the cast iron pipe was laid on top of the coated Transite and the two cast-iron sections were bolted together through side flanges. This system was not economical.

The next method approached the now accepted process, except that the grout was placed from the top. Experience showed that a more dense and uniform bond, free of air pockets, would be secured by grouting from the bottom.

added at the top as the column descends. The loop is fed from a reel of 1-in wire rope placed about 80 ft from the hole.

2. Three single sheaves form the loop. Two of these at the collar of the hole form the shoulders of the loop, and the other is in a lowering block at the foot of the pipe column. The 1-in rope runs over one shoulder sheave, down the hole and under the foot sheave, up the opposite side of the hole and over the other shoulder sheave to a hold-fast. The last sheave is stationary, but the other two sheaves rotate.

3. A pair of six-sheave shackle blocks, reeved with 2,000 ft of $\frac{5}{8}$ -in wire rope, adapt the power of a hoisting engine to lowering the loop in successive steps. The fixed block is anchored to a concrete deadman near the reel of 1-in rope.

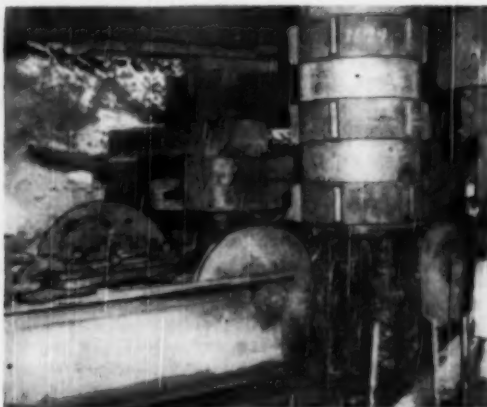


BEFORE AND AFTER views show corroded and encrusted cast iron pipes (left). Salvaged pipes (right) resist corrosive effects of acid mine water when returned to service. Assembly-line methods speed the process.

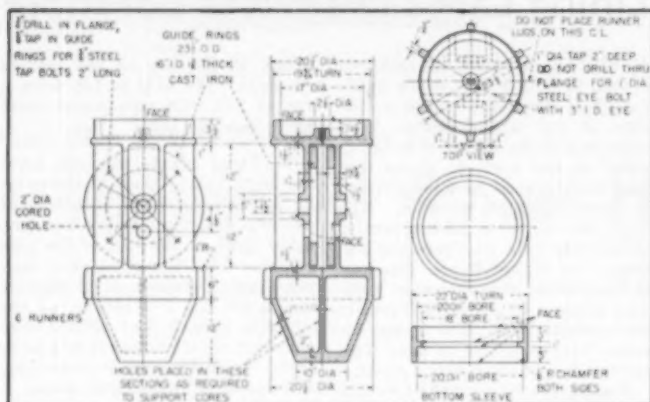
How Glen Alden Lines Boreholes to Cut Drainage Costs



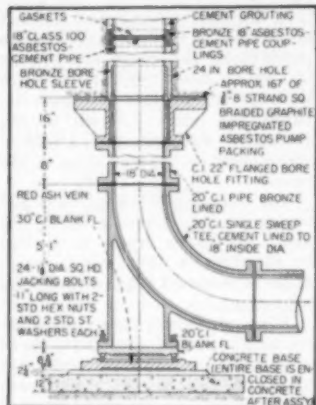
PIPE-LOWERING BLOCKS feed rope from the reel into the borehole to lengthen the lowering loop.



SHOULDER-SHEAVE ASSEMBLY controls pipe-lowering loop during successive lowering steps.



LOWERING BLOCK for wet boreholes and bottom sleeve to join block and first pipe section are made in Glen Alden's shop.



FOOT-ELBOW ASSEMBLY, at bottom of relatively dry hole, provides tight connection.

The movable block is mounted on a sled that travels back and forth between the fixed block and the hole.

4. A hoisting engine controls pipe placement. The free end of the $\frac{5}{8}$ -in wire rope from the fixed block is fastened to the main drum of the hoist, and an auxiliary drum and rope are provided for hoisting the Transite sections into position for connection to the pipe column.

5. Three clamps control the loop during the lowering operation. One clamp is the holdfast to which the dead end of the 1-in rope is permanently fixed and is part of the shoulder-sheave assembly on that side of the hole. Another clamp is part of the second shoulder-sheave assembly. The last clamp is fixed to the sled-mounted movable block.

Sequence of operations in lowering the pipe is as follows: With the movable block and sled in back-up position, the clamp attached to the movable block is tightened to grip the 1-in rope. The clamp on the assembly at the near side of the hole is loose. As the hoisting engine unreels $\frac{5}{8}$ -in rope from the main drum the distance between the blocks increases and the sled moves toward the hole. The 1-in rope is gripped by the clamp on the movable block but is free to thread through the clamp at the collar of the hole. In moving toward the hole the sled feeds rope into the hole, thus lengthening the loop downward.

When the sled reaches its forward limit of travel the clamp at the collar of the hole is tightened to hold the loop stationary. The clamp attached to the movable

block is loosened and the hoisting engine pulls the movable block and sled to the backed-up position for another grip on the 1-in rope. The clamp on the movable block slides over a full length of unreeling 1-in rope as it backs up. Then the clamp on the movable block is tightened and the one at the collar of the hole is loosened and the lowering process is repeated.

As the top of each Transite section comes down to the working platform, hoisting is stopped until a new section is added. Special bronze couplings made in Exeter shop seal the joints effectively. A 1-in-wide collar inside the coupling rests on the lower section of pipe and supports the upper section. Cloth-inserted rubber gaskets seal the space between the pipe and coupling on each side of the collar,



AUXILIARY HOIST DRUM lifts next pipe section into position to be added to lining.

and asphalt roof cement is used to caulk the joints. Six projecting fins on the outside of each coupling stiffen the joints and center the pipe column in the hole.

The lowering block is an important assembly. From top to bottom it consists of a bracket for the lower sleeve that receives the first section of pipe and supports it and subsequent sections; a housing for the 22-in sheave that forms the foot of the loop; an annular ring with centering fins similar to those on the couplings; and a tapered leading nose.

It should be pointed out that this type lowering block is used in a borehole which, because of the large amount of water intercepted, may not safely be opened out at the bottom into the mine workings. In fact, the hole may be full of water, and under these conditions the interior of the Transite column also is filled with water, as the pipe is assembled in the hole to prevent inward leakage and to counteract the buoyant forces of the water in the hole.

A water-filled hole is usually stopped about 15 ft above the seam to which it will eventually drop. Grease is smeared over the lowering block to facilitate its later removal from the solidified grout, prevent corrosion and ease its passage through the hole.

The bottom end of the tapered nose is designed to serve as a suitable one-point support for the entire load when it finally reaches the bottom of the blind water-filled borehole.

When the nose rests on the bottom of the hole, the 1-in lowering

rope can be removed. This is done by welding a small (say $\frac{1}{2}$ -in) rope to the dead end, loosening the dead-end clamp and pulling up the large rope as the small rope is let down. This process is then repeated with a single wire welded to the end of the small rope so that a loop of wire is now substituted for the loop of 1-in rope. The wire is left in the hole and imbedded in the grout.

After grouting is completed an opening is driven from the active workings to intercept the borehole. The wire around the foot sheave is cut and the lowering block is taken out of the solid grout surrounding it. Then Transite pipe of sufficient length to extend down to the foot-elbow assembly is added to the lining of the hole. A roof flange and foot elbow are jacked up against the completed lining to seal all joints, and a substitute roof of reinforced concrete is built up from the roof flange to the previously grouted section of the borehole. After this concrete has set, any possible joints or leaks are sealed by high-pressure grouting.

The weight of the pipe column is supported by the grout bond between the Transite and the sides of the hole while the foot-elbow assembly is being placed. The foot elbow is a single-sweep tee cast as a unit in Glen Alden's shops. Separate cores in the elbow and supporting section insure greatest wall strength at the bend of the elbow.

A relatively dry borehole, or one that does not intercept excessive water, can be drilled to break out in the mine openings, or preferably, into a pillar adjacent to an opening to preserve the roof. There usually is some water in every borehole and falling water and high-velocity air currents created miserable working conditions around the foot of a borehole until Glen Alden personnel designed a plug to solve the problem. The plug is made from two steel disks, each $23\frac{1}{2}$ in in diameter, spaced about 10 in apart by a 2-in pipe through their centers. The pipe is cut off flush with the top disk and extends about 3 in below the bottom disk. A length of rubber hose is attached to this end of the pipe. A split automobile inner tube is cemented and clamped around the edges of the disks to form an airtight drum with rubber sidewalls, and a tire valve is fitted into the bottom disk.

The improvised plug is inserted into the bottom of the borehole and air is pumped into it through the

tire valve. The rubber sides expand to seal the hole and water that collects on top of the plug drains away through the pipe and hose.

A lowering block without a leading nose is used in relatively dry holes because the block is not required to support the load at the bottom of the hole. When the Transite column is lowered so that the lowering block projects from the bottom of the hole the roof flange is lifted into position. The inside diameter of the flange is sufficient to clear the lowering block and slots in the flange permit the pulley to pass through it, but the lower sleeve at the bottom of the pipe column seats itself on the roof flange. The top of the flange is fitted with asbestos pump packing and the flange is jacked tightly against the roof by heavy-duty hydraulic jacks. The flange and jacks relieve the rope of its load and the lowering block is removed from the loop.

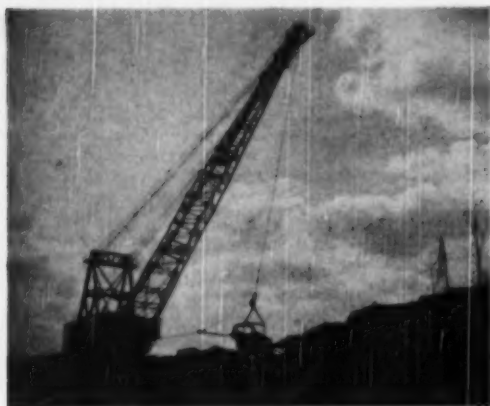
The dead end of the 1-in rope is lowered by a smaller rope welded to it. The welded joint is about 4 ft long and when the joint reaches the bottom of the hole it is cut apart and both ropes are then withdrawn from the hole. The long welded joint provides stiff ends that prevent the ropes from curling and hooking the fins on the couplings.

The foot elbow is moved to its position between the hydraulic jacks and tightened up to form a final seal by jackbolts and wedges under its own foot. The hydraulic jacks are removed and the hole is ready for grouting.

Preparations for lining a relatively dry borehole, prior to lowering the Transite, include trimming the roof around the foot of the borehole to provide a smooth seat for the borehole flange and its packing. This is done with the aid of a cylindrical, loose-fitting, hollow steel plug with an extended central spindle. This plug is wedged into the hole with the spindle coinciding with the vertical axis of the hole. A sweep arm, perpendicular to the spindle, gages the trimming of the roof. It is rotated by hand to detect roof projections, and such projections are removed with a bush cutter that is adapted to a jackhammer.

Grouting is done through one or two $\frac{3}{4}$ -in pipes that first extend to the bottom of the hole and are withdrawn as the grout level rises. When the grout sets and the pump discharge is connected to the foot elbow the hole is ready for service.

Efficient Strip Methods Handle Twin Problems of Tough Cover and Parting



WALKING DRAGLINE removes overburden. Highwall, with up to 40 ft of sandstone, requires heavy shooting.



SELF-PROPELLED RIG drills top seam for shooting. Limestone beneath will be cast between coal and bank.



DIESEL SHOVEL loads top seam into trucks, thus exposing hard limestone between upper and lower seams.



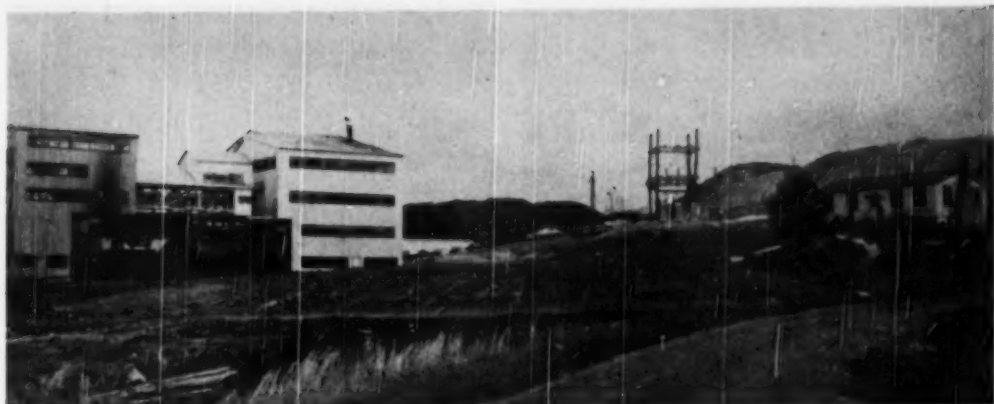
TWO JUMBO DRILLS prepare limestone, 3 to 10 ft thick, for shooting. Each jumbo drills 150 holes per hour.



PIT TRACTOR, equipped with half a truck rim for pulling cable, does other pit jobs as well.



DRAINAGE, when needed, is provided through galvanized-iron pipe. Joints are locked with hand lever.



APPROACH TO COLONIAL MINE shows recrushing and preparation plant astride railroad tracks, supply warehouse and shops just over the hill, main transformer substation and trim mine office with grass and paved walkways and stairs.

Strip Mining Two Seams

Here's How a West Kentucky Company . . .

**Mines Two Seams Efficiently in a Single Pit
Builds Ingenious Helps for Mine, Tipple and Shop
Obtains Safe Grounding for Power Substations
Prepares a Clean, High-Quality Product**

SPECIAL DRILLING and heavy shooting help solve the double trouble of tough sandstone overburden and a hard limestone parting in strip mining the No. 12 and

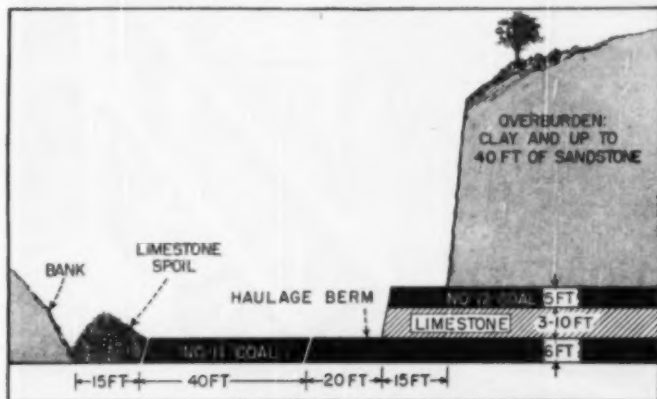
No. 11 seams simultaneously at the Colonial mine, Colonial Coal Mining Co., Inc., some 10 mi west of Madisonville, Ky.

This is mostly a hillside opera-

tion in rolling terrain. The hard sandstone cover ranges from zero at the crop line up to 40 ft or more at the 70-ft stripping limit. The limestone parting between the two seams ranges from 3 to 10 ft thick and is extremely hard.

With this thorny problem, how well does Colonial do? Production runs about 3,000 tpd of washed industrial, domestic and stoker coal, together with some railroad coal, and productive efficiency is high.

In addition to working the No. 12 and No. 11 seams, the company also strips the No. 9 seam. This coal, some 5 ft thick, lies about

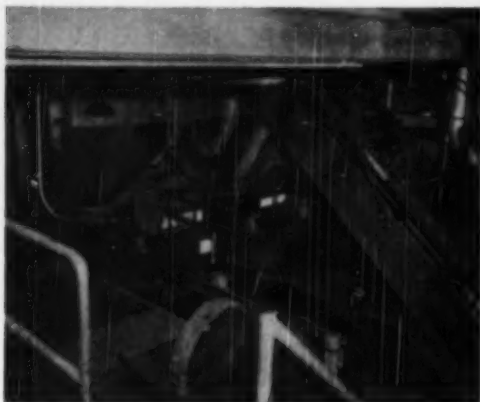


TWO-SEAM STRIP MINING with limestone parting uses two coal berms for haulage. Top berm is loaded after dragline's next pass; lower berm, last before pit is abandoned.



JAMES A. MINER, president, directs Colonial's operations.

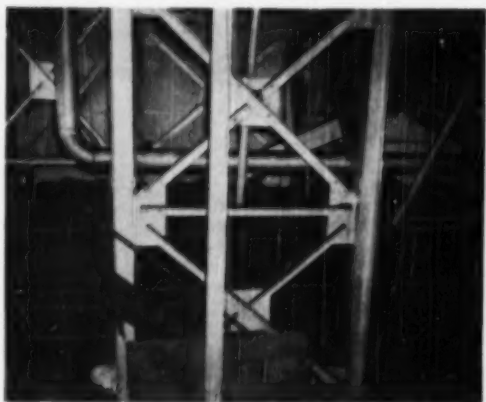
Preparation Equipment Geared to High-Quality Output From Two Seams



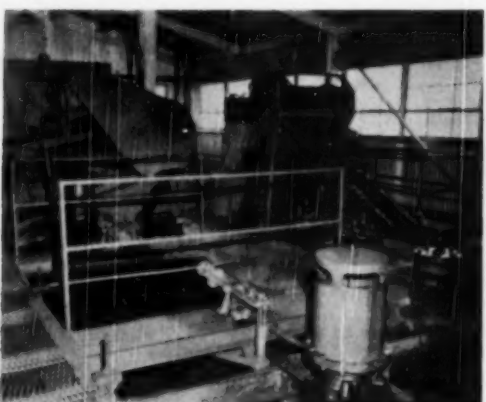
TWIN JIGS wash $1\frac{1}{4}\times 0$ coal. Storage bins above are fed by conveyors from primary shaker screen.



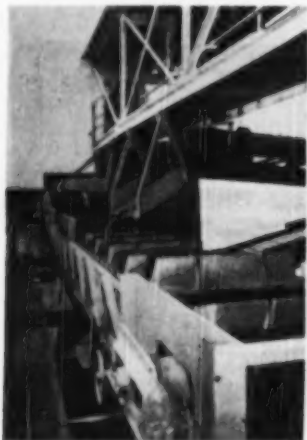
DOUBLE-DECK VIBRATOR is fed from jigs. The $1\frac{1}{4}\times 0$ is dewatered on a 10-mesh screen.



SETTLING TANK receives $\frac{3}{4}\times 0$ breakage from $1\frac{1}{4}\times 6$ dewatering shaker. Breakage is dragged out and conveyed to jigs.



WASHBOX receives $1\frac{1}{4}\times 0$ coal from primary shaker. Refuse is carried out by bucket elevator at right rear.



RECRUSHING PLANT can reduce main-plant products to maximum $1\frac{1}{4}$ -in. size.



ALL REFUSE from the preparation plant is gathered into this drag conveyor and discharged into a single hopper, whence it is hauled away to an old pit.



HYDRAULIC TRANSMISSIONS, bought as war surplus, have been adapted by H. S. Pickens (left), machinist, and G. W. Hudson, shop superintendent, to make a portable milling machine and, shown at right with Jim Bowles, welder, an auger-rebuilding rig.



LOCUSTS PLANTED on banks have grown 15 ft in two seasons (left). Those at right are thriving too, though they have only one season's growth.



ELEVATOR in preparation plant eases H. B. Day's maintenance job.

80 ft below the No. 11 seam and is accessible for stripping in lower-lying land. But the No. 9 coal, containing some 8% ash when unwashed and once a steam-market favorite when raw coal was more acceptable than now, is mined only when there is a demand for it, and the stripping is done independently of and remote from the simultaneous operation on the other two seams. However, in one respect, as will be shown later, the No. 9 seam complicates Colonial's problems.

Of the total output from the two-seam operation, the top seam, No. 12, adds up to about 33%. This seam contains several free bands of thin shale and, when washed, contains some 12% ash. The No. 11 seam is split by two clay or shale partings. After

washing, $1\frac{1}{4} \times 6$ -in sizes from No. 11 contain about $3\frac{1}{2}$ to 5% ash; $1\frac{1}{4} \times 28$ -mesh sizes, 5 to $6\frac{1}{2}$ % ash. The two coals are not blended but are loaded separately in the pit and prepared separately.

• Heavy shooting prepares the sandstone overburden for the dragline—a Marion 7400 walker equipped with a 175-ft boom and a 12-yd Esco bucket and powered by a 4,200-v circuit from a transformer substation near by. Both horizontal and vertical holes are drilled in the highwall—two rows of vertical holes on 15-ft centers and a single row of horizontal holes on 15-ft centers about 3 ft above the No. 12 seam. Ordinarily, Hercules Coalex shoots the overburden satisfactorily but when sandstone is especially tough, 40% dynamite with Primacord produces

good results. Vertical and horizontal charges are shot at almost the same instant, the horizontal holes being fired a fraction of a second later by delay-action caps. Paul Lyons, shooting foreman at the pit, reports that he uses about 350 lb of explosives for every 90 to 100 ft of hole depth.

The dragline moves in after the blasting, uncovering a 75-ft-wide section of the No. 12 seam and casting the overburden down the hillside or into the pit previously mined. However, the overburden is cast far enough away to leave a 15-ft-wide area clear between the base of the new bank and the edge of the newly uncovered coal. This 15-ft strip later is filled with the limestone lying between the No. 12 and No. 11 seams.

The No. 12 coal, about 5 ft thick,

Management Team Plays Important Part in Colonial Productivity



MINING HUSTLERS in the pit at Colonial—Chester Zentmyer (left), "Cat skinner," Paul Lyons, shooting foreman; and C. A. Kelly, general superintendent.



TIPPLE BOSS—Luke Shoulders, preparation-plant superintendent at Colonial.

has to be shot. It is drilled with a self-propelled Parmanco heavy-duty drill rig powered by a Wisconsin air-cooled gasoline engine.

A 54-B Bucyrus-Erie diesel shovel with a 4-yd dipper loads a 60-ft-wide section of the No. 12 coal, a 15-ft berm left next to the highwall as a haulage road for the trucks and as a platform for the horizontal drills working into the new highwall. This berm is not loaded out until the dragline cuts the new pit in its next pass.

• **Removal of the No. 12 seam exposes the hard limestone parting**, which, as stated earlier, ranges from 3 to 10 ft in thickness. The limestone is drilled by two jumbo drill rigs, each with twin jackhammers, mounted on diesel-powered Caterpillar D-8 tractors. On one of the Caterpillars the drills are Clevelands, bolted to the front end of the tractor. The compressor, mounted on the rear, is driven by a direct power take-off from the engine. The drills can be dismantled and replaced with a 'dozer blade in an hour's time.

The second tractor is fitted with Gardner-Denver drills, not demountable, and the compressor is driven by a belt connected to the power take-off shaft.

Throwaway bits are used altogether on both drill rigs. Holes are drilled 1½ in in diameter on 6-ft centers and are shot in groups of about 200 with 1½-in Egyptian dynamite. Each jumbo can drill about 150 holes per shift.

A 170-B Bucyrus-Erie electric shovel, 440 v, with a 5-yd dipper scoops up a 60-ft width of the limestone up to the No. 12 berm and drops it into the 15-ft-wide

area left clear for this purpose by the dragline as it casts the spoil. The limestone contains too little calcium for agricultural use but part of it is used for building roads around the property.

The 6-ft No. 11 seam, now exposed after the limestone has been removed, also has to be shot. After the shooting, the 54-B shovel loads out a 40-ft-wide section of the coal, leaving a 20-ft berm below and adjacent to the 15-ft No. 12 berm. This second berm also is used for haulage. Trucks enter the pit on the No. 12 berm, drop down to the No. 11 berm on ramps built by the pit 'dozer and the shovel, and leave the pit on the No. 11 berm. The No. 11 berm is loaded out as the last step before the pit is abandoned.

From time to time, when No. 9 coal is being mined, C. A. Kelly, general superintendent, sends the 54-B shovel over to the No. 9 pit and the 170-B shovel takes over the loading job in the two-seam pit, as well as the limestone-handling chore.

A third Caterpillar D-8 with a 'dozer blade does yeoman service in the pit, giving haulage trucks a push or a pull when needed, building ramps from one berm to the other, cleaning off the exposed coal and pulling cable. For this last job, half of an old truck rim has been bolted to the rear end of the tractor. When cable has to be moved, it is looped six or eight times around the half-rim and thus is pulled along easily with a minimum of wear.

• **Seven units haul coal from pit to tipple**—at present, a distance of about 1 mi. There are five White

tractors with 150- and 200-hp Cummins diesel engines and 20- to 30-ton United Iron Works semi-trailers, and two 16-ton Euclids, also with Cummins diesel engines.

In addition to pit-haulage units, two 12-ton White end-dump trucks with Cummins diesels haul refuse from the preparation plant and dump it in an abandoned pit.

The coal seams slope about 1% from north to east. Water collecting in the pits often can be run off through openings left in the banks. Sometimes, however, water must be pumped out. For this job, Colonial keeps several Jaeger gasoline pumps in sizes ranging from 2 to 6 in. The water is carried out through 4-in Armco "Rainmaker" pipe, made of 16-gage galvanized iron, with rubber gasket connections. A hand-operated lever tightens a collar around each joint and makes a tight seal. Though tight, the joints still are flexible enough to turn over the tops of banks or to round corners up to 100-ft radius.

The pipe comes in 20-ft lengths, each length being light enough for one man to carry. Rubber hose can be pieced in between lengths of pipe when sharp turns are needed and hose always is used between the pump and the first length of pipe. With adapters, the pipe can be used with any size of pump or in two or three connections to the same pump. This adaptability eliminates the need for carrying stocks of different-size pipe and hose in inventory. Cost of the metal pipe is about half that of rubber hose and wear is negligible, Colonial officials report.

• **All coal from the No. 12 and**



TOP SHOP MAN—G. W. Hudson, Colonial's shop foreman.

No. 11 seam is crushed and washed in the preparation plant. After passing through a 24x54-in McNally double-roll crusher for reduction to a maximum 6-in size, the raw coal goes over a primary shaker screen, where the $1\frac{1}{4}$ x0 is taken out. The $1\frac{1}{4}$ x0 goes to two Ore Reclamation Co. jigs and then passes onto an Allis-Chalmers 6x16 double-deck vibrator with a $\frac{3}{4}$ -in top deck and a $\frac{1}{4}$ -in bottom deck. The $\frac{1}{4}$ x0 coal goes to a 10-mesh dewatering screen, whence it can be loaded separately into railroad cars from any of the five loading stations or mixed into any of the other products coming from the plant. The $\frac{1}{4}$ x $\frac{3}{4}$ size from the vibrator is not dried and can be loaded separately or mixed as desired.

The $1\frac{1}{4}$ x6 coal from the primary shaker screen is conveyed to a No. 5 McNally-Norton washbox and thence to a dewatering shaker. The shaker is equipped with interchangeable screens to size out $\frac{3}{4}$ x $1\frac{1}{4}$, $1\frac{1}{4}$ x3, $1\frac{1}{4}$ x4, 3x6 or 4x6. The $\frac{3}{4}$ x0 coal resulting from breakage on the dewatering shaker is conveyed by water to a 20x90-ft settling tank, where it is dragged out and conveyed to the ORC jigs.

The three loading booms can be moved to discharge onto an intercepting drag conveyor, which takes all sizes over $1\frac{1}{4}$ to a recrushing plant located on the opposite side of the tracks and housed in an auxiliary building. In the recrushing plant, the coal passes through a 24x48-in McNally double-roll stoker crusher and over a 6x16-in Allis-Chalmers double-deck "Ripl-Flo" screen. Products from the recrushing plant are returned on the same

drag conveyor and loaded onto any of the three tracks. With the recrushing plant, it is possible to keep everything under a top size of $1\frac{1}{4}$ in.

Minus 28-mesh fines from the screens are discharged with the plant slurry and pumped to an old pit. There the wastes settle out in a distance of about $1\frac{1}{2}$ mi and the clear water is returned to the freshwater pump. This closed circuit avoids any stream pollution. A nearby lake, stocked with fish, provides additional makeup water.

One unusual feature in the preparation plant is an elevator built by Luke Shoulders, preparation superintendent, and H. B. Day, tippie maintenance man. Powered by a 5-hp General Electric motor and controlled by a G.E. oil switch, the elevator moves heavy supplies, such as acetylene and oxygen tanks, between the ground floor and the second deck, where Mr. Day's shop is located, or the third deck.

Elevator capacity is about $1\frac{1}{2}$ tons. Doors for the elevator are cut in the steel-plate decks and are so fitted that, when the elevator rises and pushes them upward and open, they will not fall flat to the outside and thus leave the shaft open. They must be closed manually. But if they are left open they act, together with a pair of guard rails, as protection against anyone's falling into the shaft.

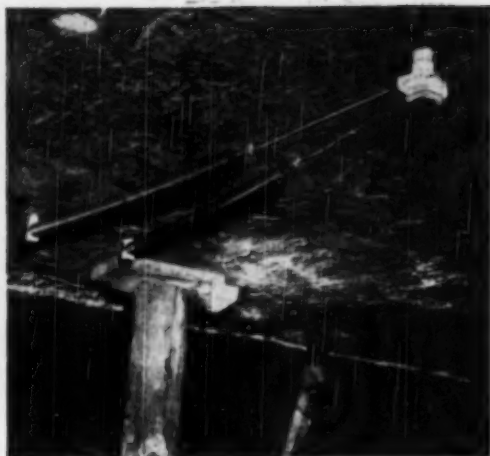
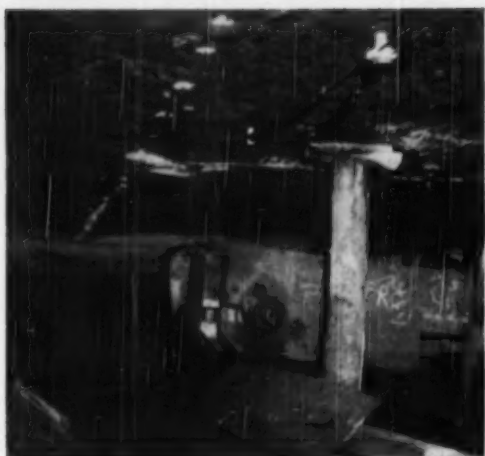
• The shop and garage building is close by the plant and supply house. There, G. W. Hudson, shop superintendent, and H. S. Pickens, machinist, have made ingenious use of two war-surplus Vickers hydraulic transmissions used in the recent war to turn anti-aircraft guns. Mr. Hudson and Mr. Pickens have adapted one for use in cutting keyways in heavy shafts, thus avoiding the need for a milling machine and any transfer of the shafts from the lathe to some other spot in the shop. The keyway-cutting assembly is mounted on a rolling work table for easy movement about the shop. A variable-speed control had been added to the Vickers unit, transmitting the power of the 1,720 rpm, 1-hp G.E. driving motor to a flexible driveshaft at speeds ranging up to 600 rpm. The chuck arbor near the business end of the assembly accommodates all sizes of cutters up to 1 in.

The second Vickers unit turns up in the welder's shop. There it is used to turn augers at a uni-

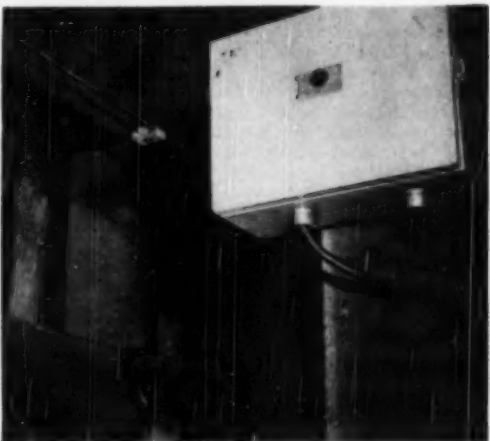
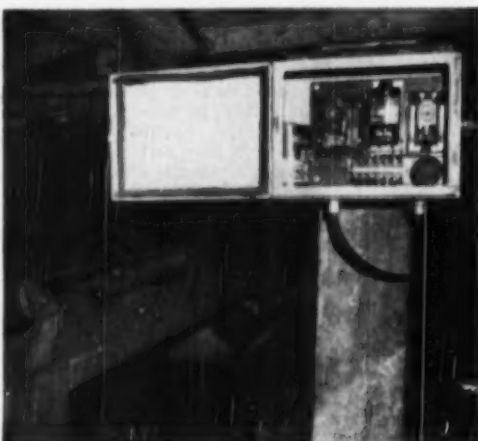
form speed while the welder rebuilds them. Power comes from a $1\frac{1}{2}$ -hp G.E. motor and is transmitted through the hydraulic transmission and a worm gear at controllable speeds up to 100 rpm. Usually, speed for rebuilding augers is about $\frac{1}{2}$ rpm. Rollers at the far end of the auger cradle it and permit it to turn easily and evenly. The welder simply lays one end of the auger on the rollers, fits the opposite end to an adapter on the worm-gear drive-shaft, adjusts the speed of rotation, sits down on his bench and holds his welding rod steady, following the path of the auger worm as it moves from left to right. This makes it easy to do an even rebuilding job.

• Power for Colonial's operations is brought in on a 2,260-v highline. Field transformers are all enclosed in wooden houses with double swinging doors and are provided with a "hot stick" so that a man can stand outside and control all switches. The "hot houses" are mounted on skids for easy moving. Grounding is taken care of by piping the ground wire down through a deep drill hole. At first, some trouble was encountered by failures of the grounding system. A. Mitchell, Colonial's electrician, soon found the cause of the trouble. The drill hole, he discovered, should penetrate to about the same level as the central transformer station and, in any event, since the No. 9 seam seemed to be shorting out the ground system, should go below that seam. This meant drilling some grounding holes deeper than 100 ft. However, since the time when the holes were taken below the No. 9 seam, there has been no grounding trouble. The holes are drilled at all transformer substations and wherever cable connects to the power line in the "hot houses."

Under the guidance of James A. Miner, president and general manager, extensive tree planting on the banks is showing good results. The hillside land is not tillable before stripping upturns it, though the nearby valleys, where there is no coal, are fertile farm lands. The stripped hillsides, once churned up and left uncompacted, support locusts, pines, oaks and walnuts. In 1949, Colonial planted 80,000 trees on its banks, bringing the total to 175,000 in three planting seasons. The work is supervised by the Reclamation Association of West Kentucky.



START, STOP AND LOCKOUT with two bare wires carrying only 3 v feature new Bolair conveyor control. Left is a main-belt section with control wires overhead. Right is a special slotted insulator for easy installation and springs for proper tensioning.



IMPROVED CONTROL BOX showing (left) cable entrances sealed with glands, door fitted with sponge rubber, lamp to keep unit warm and dry, and two dry cells on the left-hand side. Unit with cover closed is shown at the right with control wires in the background.

Simplified Conveyor Control

New Bolair-Developed System . . .

Provides Full Control With Two Bare Wires

Operates on 3 Instead of 20 to 30 V

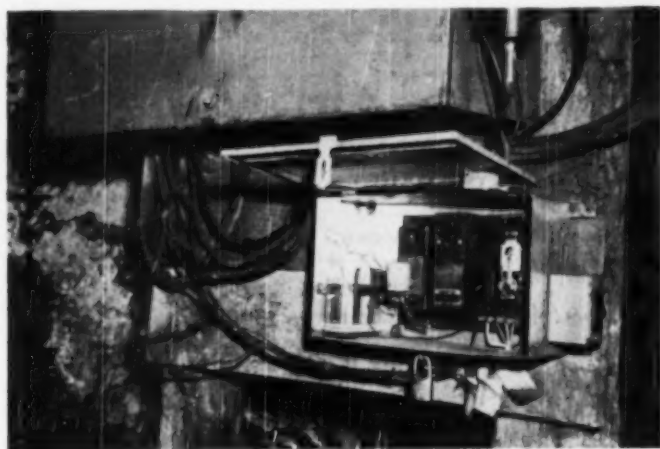
Includes Timing to Prevent Jogging

Promotes Safety and Reduces Maintenance

LOWER COST, lower maintenance, greater safety, and start, stop and lockout functions are the outstanding advantages mine officials of the Pardee & Curtin Lumber Co. see in a new belt-conveyor control system working on 3-v power. This system has been installed on two of the belts in Bolair No. 1 mine to replace the original push-button stations spaced at 150-ft intervals to provide start, stop and lockout control.



SIMPLICITY OF OPERATION is demonstrated by Co-inventor Brooks H. Keener, who is squeezing the wires together to stop the belt.



FIRST INSTALLATION at the mine was this experimental control box, above which is the magnetic starter to which the new unit was applied.

In the new system two bare wires are strung above the belt for the full length of each section. Belt control is accomplished by a man reaching up at any point and squeezing the two bare wires together. In this respect the system is not too different from safety belt controls that have been used in other mines. The difference lies in the fact that the Bolair system uses only 3 v and a small fraction of an ampere (about 0.035) instead of 20 to 30 v, and in the fact that the conveyor can be started, stopped and locked out from these low-voltage bare wires.

• **Operating Equipment** — The equipment, in addition to the con-

trol wires strung above the conveyor, consists only of a small box containing two No. 6 dry cells, a current-sensitive relay, a timing relay and a ratchet relay. Patents covering the control have been applied for by Brooks H. Keener, control foreman, Bolair No. 1 mine, and Robert P. Dice, formerly an electrician in the same mine and now employed at the Weirton mine, near Morgantown, W. Va. They made an arrangement with the Ensign Electrical & Manufacturing Co., Huntington, W. Va., to manufacture and market the system, now known as the "Ensigner Control."

• **Operating Method**—The ratchet

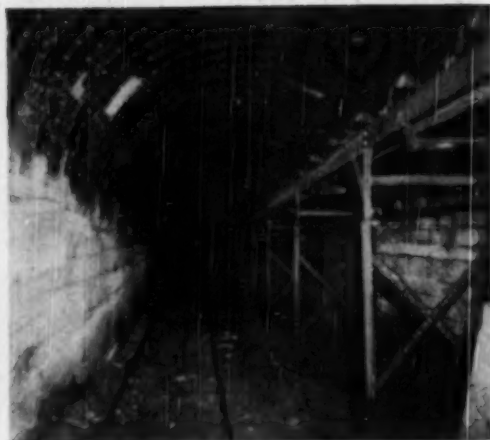
relay operates so that touching the bare wires together stops the conveyor motor, touching them together a second time starts the unit, and so on. If the conveyor is running and the wires are held together, the unit is kept out of operation as long as the contact between the wires is maintained. The timing relay is necessary so that a quickly repeated touching together of the bare wires will not restart the motor if it has just been stopped and will not stop it if it is being started. The time delay can be adjusted from a few seconds to 2 min. At Bolair it is set at about 3 sec. After that time has elapsed, touching the wires together causes instantaneous action, but with the start of this action the timing starts again to prevent jogging.

• **Suspension**—The first of these safety-control units installed in the mine was assembled by coal-company electricians and was tried out with the bare wires suspended in temporary fashion. When the photographs were made, the wires had been reinstalled on special slotted porcelain insulators with tension springs, both supplied by Ensign Electrical.

While several types and sizes of wires have been tried, the preference is for No. 10 or No. 12 hard-drawn solid copper. These wires, larger than would be required for current-carrying capacity, are easier to grasp and pinch together, are sufficiently strong and are less subject to stretch than soft-drawn copper.

• **Contact Maintenance**—Officials of the mine have wondered if corrosion of the copper wires would make contact difficult but there is no such indication. Further assurance is word from a Pennsylvania mine that has used the 20- to 30-v bare-copper-wire signal system for some years that there has been no trouble from corrosion. The Pennsylvania system is used only for emergency stopping.

Since the "Ensigner Control" as installed at Bolair No. 1 carries only 3 v, the bare wires are easy to insulate. Elimination of 275-v control wires along the belt line is a safety factor and also reduces first cost and maintenance. Above all, there is the safety feature that in any emergency the belt can be stopped instantly from any point along its length and can be locked out. This safety-control system can be applied to any unit already equipped with the necessary magnetic starter.



PLANNED FOR CLOSEST POSSIBLE APPROACH to continuous production, tipple (left) and steel-lined slope (right) indicate careful planning and long-term construction required to get a 1950 mine in operation.

Continuous Mining and Belt Haulage Mark . . .

Planning at Lincoln Mine

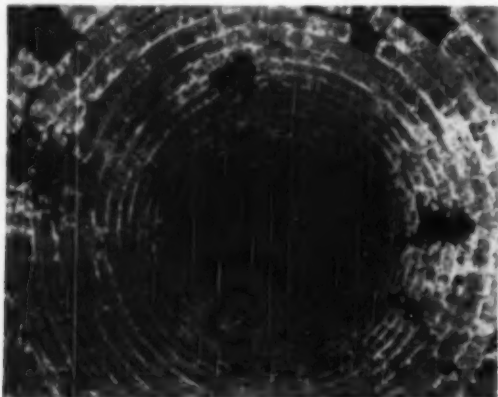
AC-Powered Continuous-Mining Machines, Shuttle Cars and Belt Conveyors, Driving Entries in New Mine, Move Coal From Solid to Railroad in 10 Min—Flexible Tipple, With 1,000-Ton Storage Capacity, Handles 300 Tph

ENGINEERED FOR 300 TPH, the new Lincoln mine of the Clayton Coal Co., Denver, Colo., is laid out to take full advantage of continu-

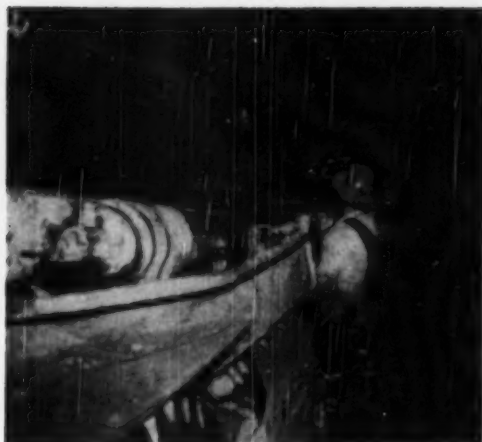
ous mining, shuttle-car intermediate haulage and belt-conveyor main haulage. The mine is 20 mi north of Denver in southwestern

Weld County and is producing from the bottom 7 ft of the 9-ft-thick Laramie formation. Although the seam contains no impurities, the top 2 ft is left in place to prevent air slacking of a soapstone roof.

The coal is reached through an 1,800-ft-long slope in which a 36-in belt is installed in two sections. This slope belt discharges to a modern tipple designed for direct loading to railroad cars, or for



STEEL-LINED AIRSHAFT (left) and fan installed with future requirements in mind insure adequate air at controlled cost as the workings advance. Service labor is kept to a minimum in steel-lined openings designed for the life of the mine.



SMOOTH COORDINATION of continuous mining (left) and conventional mining (right) results in rapid entry development. Pump intake in left photo is anchored to top coal and rotated at the double elbow to reach bottom when pumping becomes necessary.

storing over 1,000 tons in steel bins.

• **Two ac-powered Joy continuous miners**, each served by two 6-ton cable-reel Joy shuttle cars, are supplemented by two Joy 11BU loading machines, also with two shuttle cars each, in driving the main entry east from the foot of the slope and north and south entries off the main. Development in coal, as shown on the accompanying mine map, was accomplished between Jan. 1 and June 30, 1950.

Air Shaft and Slope Sunk in Soft Rock

Core drilling in 1948 proved extensive reserves of high-grade subbituminous coal in the area now opened by Lincoln mine. In 1949 an air shaft was started through 430 ft of cover to the top of the coal. The shaft is 9 ft in diameter and is lined throughout with Armco corrugated plate 3/16 in thick.

The material through which the shaft was sunk is soft and extremely wet, making it difficult to hold the ribs. To meet this problem shot-holes were drilled only in the center of the shaft, and loose material from these sumpholes was raised in a bucket hoist for surface disposal. Then the ribs were trimmed to full shaft diameter by Thor air picks.

The steel lining was installed in 18-in-wide rings as soon as sufficient depth was available. Each ring consists of seven plates. Six

of these were bolted together on the surface and lowered into the shaft. The closure plate was bolted in place after the other six were added to the bottom of the lining. An air line furnished compressed air at 100 psi for the air picks and Sullivan drills used in the shaft. Water was pumped out when it gathered in sufficient quantity to interfere with the work.

The coal seam carries water and when the air shaft broke into the coal this water entered the shaft. A pump with float valve was installed and this pump, in addition to keeping the water down in the air shaft, helped drain the area through which the slope was driven.

• **The slope was opened** by a dragline to a vertical face 20 ft high. The dragline cut was 17 ft wide with a pitch of 15 deg, the final slope pitch.

A concrete wall 18 in thick and 24 in high was built along each rib in this open cut to support the Armco steel arches that line the slope. The concrete and steel fix slope dimensions at a clear width of 14 ft and clear height of 9½ ft at the center. The height varies locally in the slope, with the height of the concrete wall adjusted accordingly.

Three shifts of five men each sank the slope, each shift shooting, loading, laying 60-lb track and adding steel in 18-in-wide arches. A Joy 11BU loaded loose material to a self-dumping pit car hoisted to a temporary tippie by a single-

drum 100-hp ac hoist. The loading machine gave excellent results in spite of the steep pitch and a soft wet bottom. Steel arches in the slope were erected in three sections, the sides being placed first and then the center sections installed to complete the arch.

The slope was driven through the same material penetrated by the air shaft, but inflowing water was a greater problem because of the extensive open face area. Constant pumping was necessary.

Approximately 150 ft down the slope the ribs began to squeeze. This condition was remedied by laying rails in a trench across the slope and concreting them in position. Steel reinforcement from the rails in the trench into the concrete rib walls stopped the squeeze.

The 1,800-ft slope was completed in 6 mos. Then the slope and air shaft were connected underground and a 72-in La-Del Axivane fan was installed at the top of the air shaft. On this type fan the pitch of the blades is changed by loosening a locking nut and turning an adjusting nut. All blades move together.

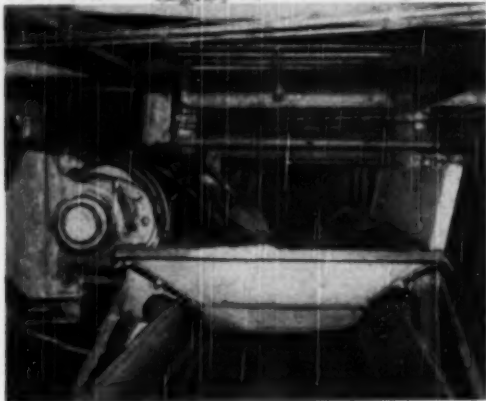
Mine Laid Out For Steady Output

Triple-heading entries are driven east from the foot of the slope. One heading was driven by a continuous miner and at the other two by a Joy 11BU mining unit. Both loading units used shuttle-car haulage to the main slope belt. One of the shuttle cars serving the con-

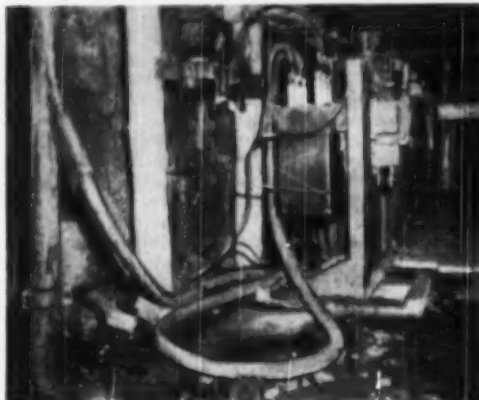
Auxiliary Services at Lincoln Designed for Low Maintenance Needs



SHUTTLE CAR in 1 North discharges to 1 East belt to start coal on 1/2-mi trip to tippie. New north belt now shortens haul.



UNINTERRUPTED TRANSPORTATION is one benefit of belt conveyors. Here slope belt takes discharge of 1 East belt to surface.



AC POWER at 2,300 v is stepped down to 440 v at this substation. Borehole cable (left) carries 2,300 v from surface substation.



DC POWER at 250 v, for pumps and loading machine, is produced in this portable m-g set. Motor operates on 440 v, ac.



CAREFUL PLANNING and controlled development are expected to result in realization of full benefits of complete mechanization. Dates indicate rate of development.

tinuous miner is a surge unit and the other a transportation car. Company officials estimate that at the present stage of development coal is mined from the solid by continuous miners, run through the tippie and loaded into railroad cars in approximately 10 min.

● Coal travel is uninterrupted, except for a pause by the surge car while it waits for the transportation car to return for another 6-ton load. The cars hauling in the north entries discharge onto the end of a 500-ft belt in 1 North, which transports the coal to a mother belt in 1 East. The latter discharges to the slope belt which carries the output to the tippie. Another 500-ft belt is being installed in 1 South and it also will discharge to the 1 East belt. Present plans include extension of the east entries to a



SEVEN STEEL BINS, on reinforced-concrete slab, have over 1,000-ton capacity to cushion production and market differences. Distributing conveyor carries sized coal over storage bins. Hand-operated gates in conveyor pan provide access to bins.



distance of 1 mi, with belt haulage throughout. North and south entries will be driven from the east entries and rooms will be turned from the north and south entries.

All belts are Barber-Greene units with a standard width of 36 in throughout the mine. The slope belts are 6-ply and the underground belts 5-ply. The slope belt is in two sections, one 964 ft long driven from the tippie, and the other 1,023 ft long driven from the transfer point. All belts operate at 350 fpm, and their controls are interlocked to prevent following belts from discharging to a belt that is down for any reason.

• A machine operator and two shuttle-car operators drive places with the continuous miner, while the conventional mining units are operated by seven-man crews made up of a loading-machine operator, cutting-machine operator and helper, two shuttle-car operators, and a driller and helper.

Sullivan 7A cutting machines with 8-ft bars and Chicago Pneumatic 472 coal drills are used in face preparation. Water trickles from the coal in such quantity that it has not been necessary to use sprays on the face equipment. Also, the efficient operation of the scrolls on the continuous miner and the wet condition of the bottom leave few fines to be dispersed by shuttle-car traffic.

Fireclay under the coal creates another problem in view of the excess water, and several methods of handling it have been tried. One was leaving a few inches of coal on the fireclay but the shuttle cars soon broke through this and made deep holes. Now the coal is taken

to the fireclay. While mushy, the fireclay is only 6 in deep and is underlain by solid sandstone.

• The continuous miners, cutting machines and belts operate on 440-v ac, and the remainder of the equipment operates on 250-v dc.

Three 333-kva transformers on the surface reduce the 13,000-v public utility power to 2,300 v. The 2,300-v line is dropped through a borehole to an underground substation. Here, three 150-kva Chlorox fireproof transformers step down from 2,300 to 440 v. The 440-v line passes through a circuit breaker and then is carried into the mine to power the ac machines. Two 75-kw Reliance m-g sets are operated from this 440-v line to produce 250-v, dc, for the other machines. The tippie operates at 440 and 220 v, ac.

Flexible Tippie Loads or Stores

The slope belt discharges to a chute in the tippie equipped with a gate for deflecting rock to a 20-ton refuse hopper. When coal is running on the belt the gate is closed and the coal is spiraled to a 42-in belt with a Dings magnetic pulley at the head end for removal of tramp iron.

The 42-in belt places the coal onto an Allis-Chalmers Ripl-Flo vibrating screen that scalps plus 2½-in material from the mine product. This coarse material is passed through a single-roll McNally-Pittsburg crusher to a reversible belt. Operating in one direction, the belt discharges to the railroad-car loading chute or to a 36-in belt for storage in any one of seven

150-ton bins. Operating in the reverse direction, the belt takes minus 2½-in coal from the single-roll crusher and discharges to a McNally-Pittsburg double-roll crusher for reduction to stoker size. This stoker coal can be loaded directly or stored. A 14x6-ft Allis-Chalmers vibrating screen precedes the double-roll crusher to scalp plus 1¼-in coal for crusher feed.

• The product of the tippie is all minus 2½ in and is used as industrial fuel. The tippie, designed and erected by Hack Engineering Co., Denver, features built-in flexibility so that the product of any screen or crusher can be loaded, stored or run through the entire circuit.

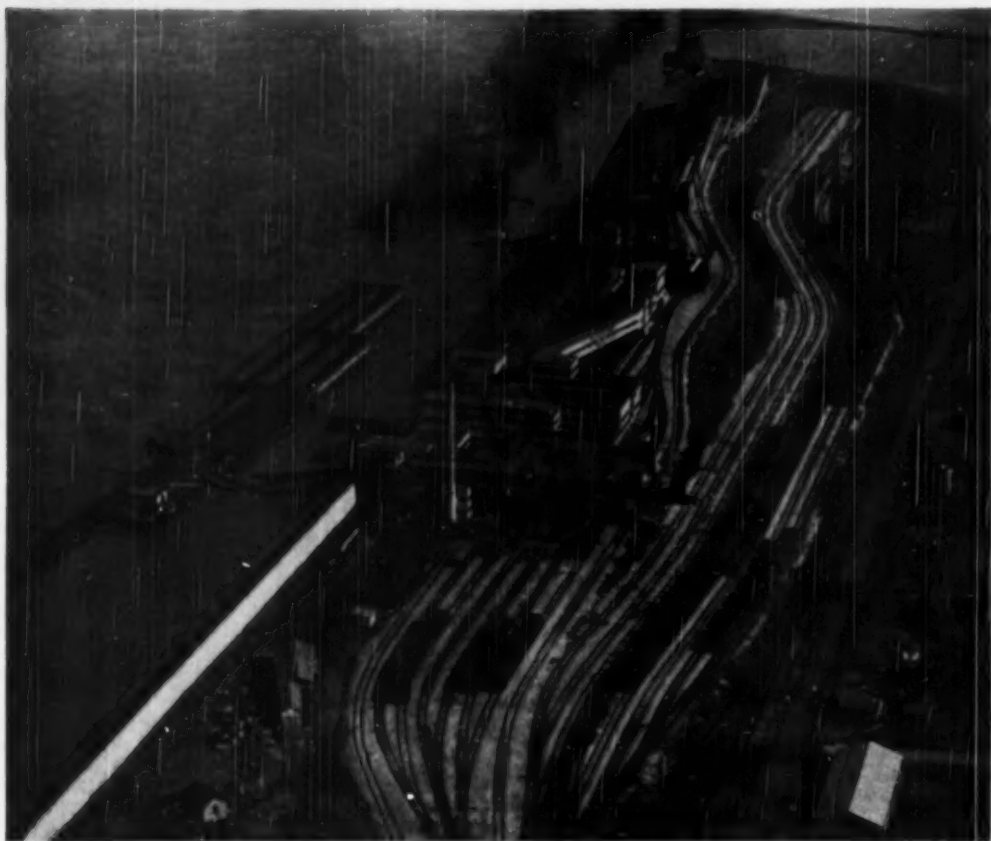
The belt to the storage bins discharges to a distributing conveyor along the tops of the bins. Manually-controlled gates in the conveyor pan provide access to the desired storage bin.

The bins have a 12-in-thick reinforced concrete base, and each is provided with a concrete funnel at the bottom to permit complete run-off and prevent degradation from long storage.

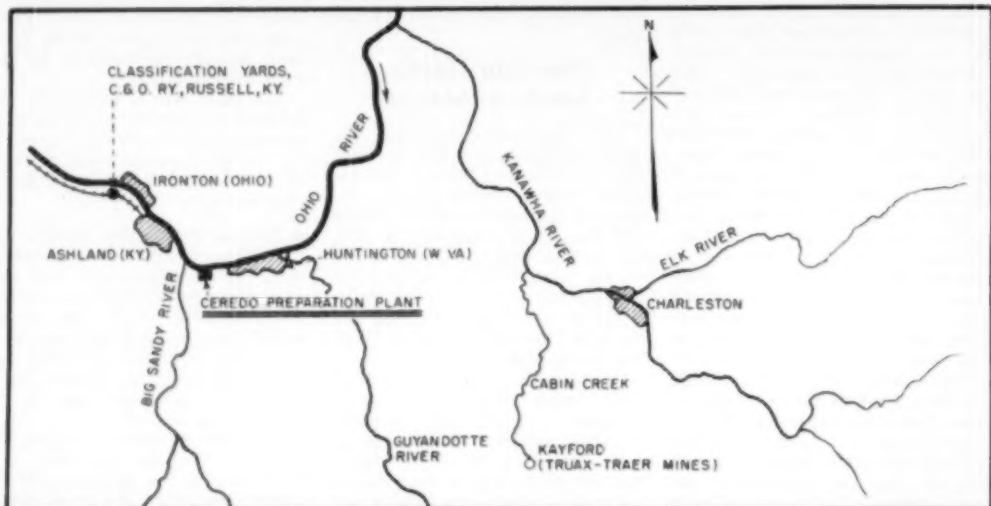
• The ac continuous miners at Lincoln are the first to be installed west of the Mississippi, and are now operating in the area where the continuous miner was developed. The original model, conceived by Carson W. Smith and built by Silver Engineering Works, Inc., Denver, is still operating at a neighboring mine.

Company operations are directed by H. B. Crandall, president, and C. W. Brown, vice president. Mine supervision is in charge of John Sidle, general superintendent.

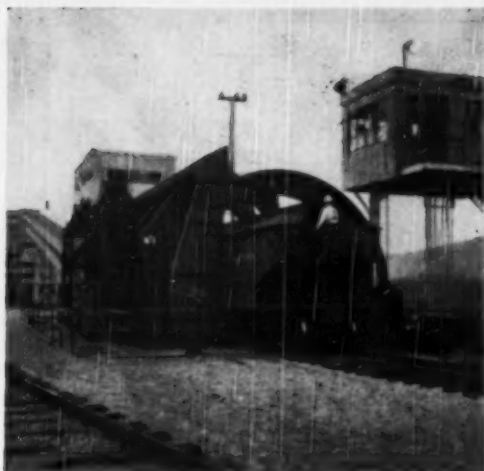
Truax-Traer's Ceredo Plant — Modern Design for Precision Preparation



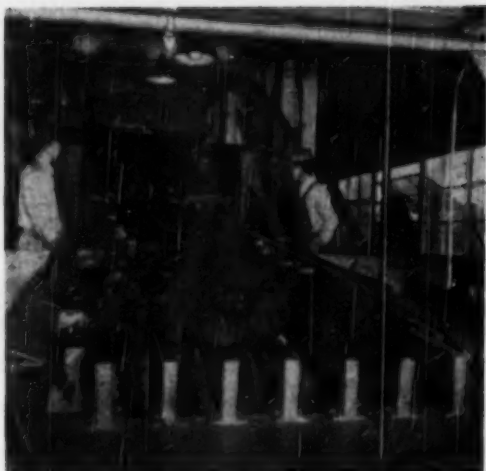
CEREDO FROM THE AIR. In the rear is the picking and crushing house and back of it the rotary car dumper. The barge-loading plant, served by a retractable belt conveyor over the flood wall along the Ohio River, is at the left.



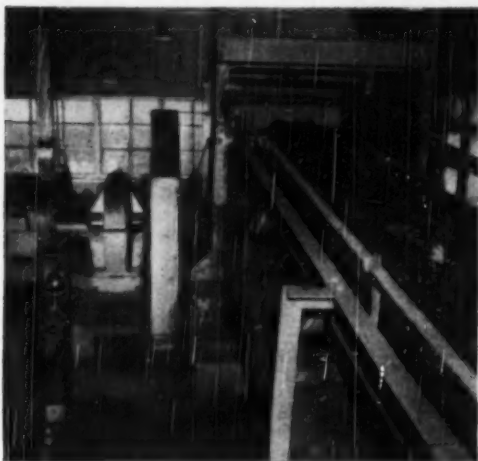
THE CEREDO CENTRAL PREPARATION PLANT is approximately 90 mi by rail from the Truax-Traer mines at Kayford, W. Va.



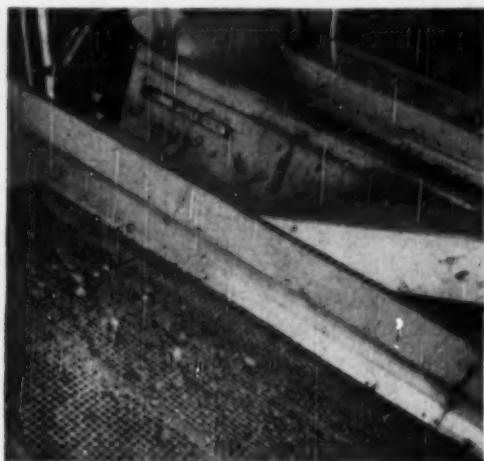
START OF THE PREPARATION CYCLE at the Ceredo central plant. Loaded cars bump empties off the rotary dump.



ONLY LOW-REFUSE COAL is washed at Ceredo. Therefore, two men can adequately pick plus 5-in as it moves to the crusher.



MAIN RAW-COAL BELT, 800 tph, is 54 in wide and 391 ft long. The drive is a 100-hp motor with reduction gear and roller chain.



THREE VIBRATORS prepare stoker from washed coal dropped from the main mixing conveyor into a crusher.

The Ceredo Story

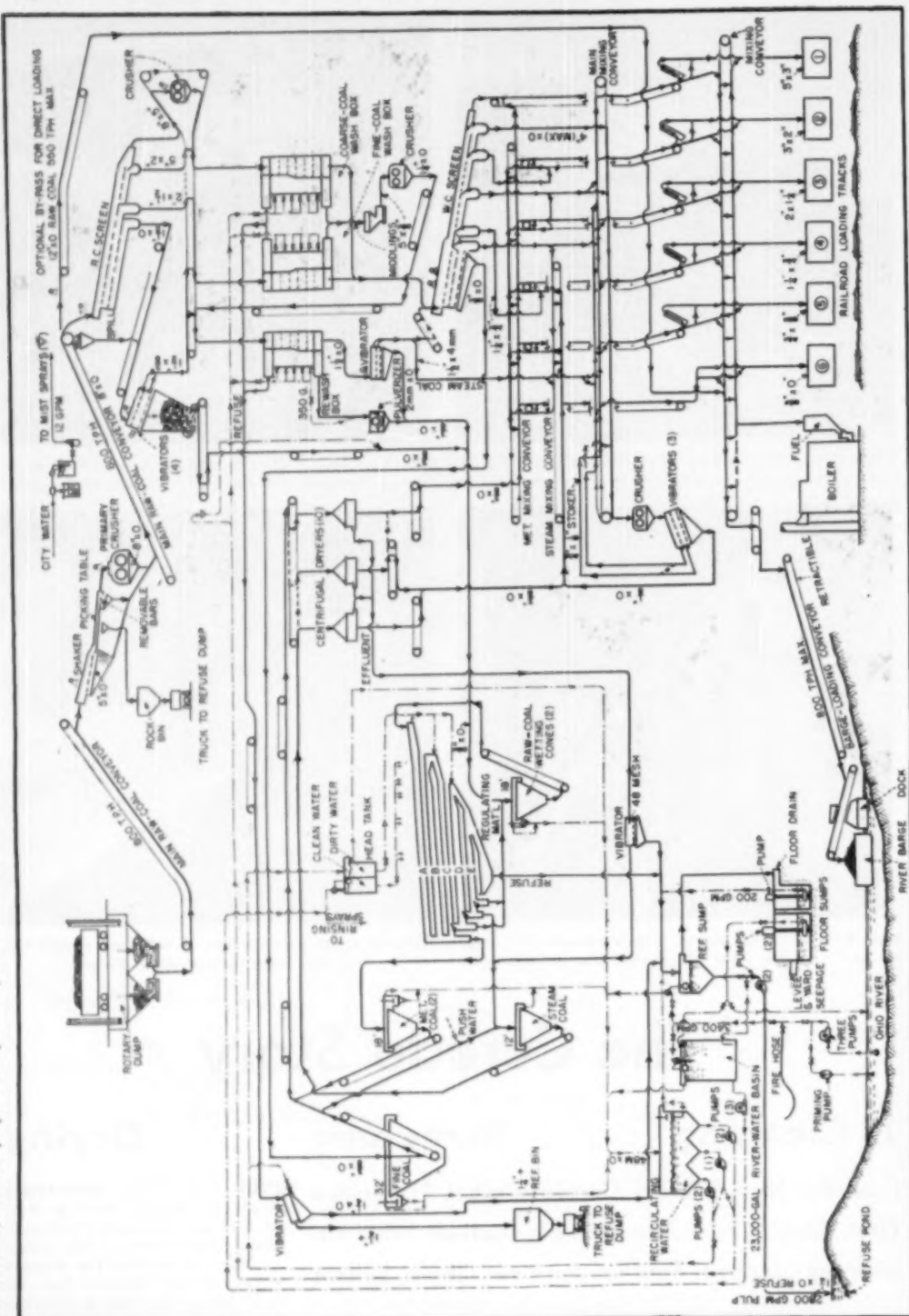
1. Cleaning . . . Screening . . . Drying

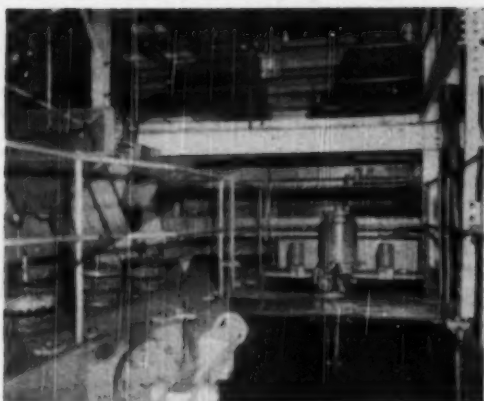
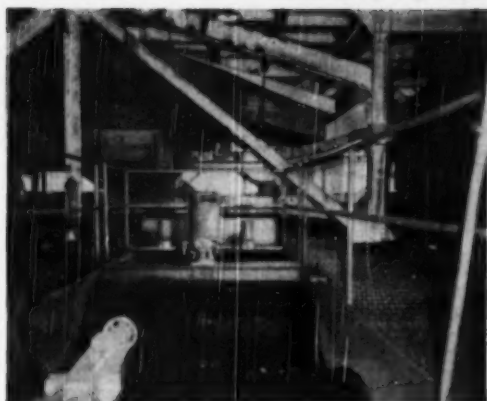
How the New 800-TPH Ceredo Central Preparation Plant, Serving Truax-Traer Mines in Southern West Virginia and Loading to Both Rail and River, Cleans, Screens and Dries Steam and Metallurgical Coal

HIGH CAPACITY, labor-saving anti-noise design, washing with launders and six-compartment jigs, sludge recovery with cones, a location 80 mi or so from the mines, a retractable track-mounted belt conveyor for moving coal to the river terminal, a walking dock, unusual

Jigs and Launder Clean Coarse and Fine Coal at Ceredo

FLWSHEET, Ceredo preparation plant—cyclone thickeners not included.





WASHING FACILITIES AT CEREDO include the six-cell coarse-coal jig at the left, with the raw-coal shaker in the upper background, and the five-cell rewash box at the right, with the raw-coal vibrators removing $\frac{3}{8}$ " for laundry treatment in the rear.

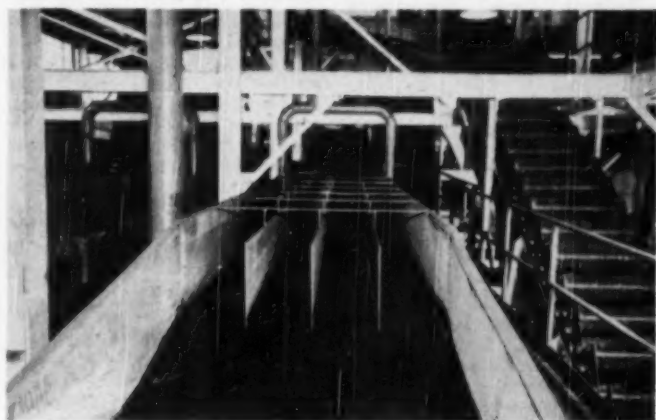
water supply facilities, and a series of four settling ponds are some of the outstanding features of the new Ceredo preparation plan which the Truax-Traer Coal Co. brought to final completion in January, 1950, at Ceredo, W. Va. This locality, chosen for both rail and river shipping, is on the Chesapeake & Ohio Ry. and the Ohio River 10 mi west of the business section of Huntington, W. Va.

In this central plant the company prepares low-refuse coals from its mines in Kanawha and Raleigh counties to meet the exacting specifications of purchasers of high-grade metallurgical and steam fuels. On that portion of the output reshipped in railroad cars the company gets the benefit of the milling-in-transit freight rate.

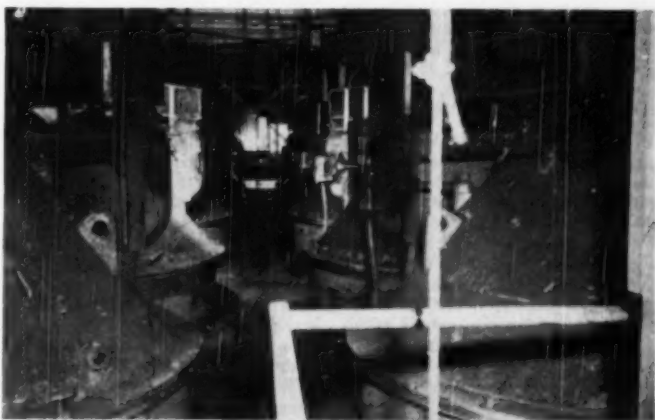
• Management and Mine Set-Up

The Truax-Traer Coal Co., with main offices in Chicago, operates under the guidance of A. H. Truax, president, and T. G. Gerow, executive vice president. Sales are under the direction of M. L. Patton, vice president in charge of sales, and George Kisker, West Virginia sales, with sales offices in Cincinnati. Truax-Traer also operates Burning Star and Red Ember mines in Illinois, and the following in West Virginia: Acme No. 2, Marfork, Raccoon No. 2 West, Rose No. 2, United, Shamrock No. 1 and Shamrock No. 2. The two Shamrock mines are in the No. 2 Gas seam, Rose No. 2 is in the Stockton-Lewiston and the others are in the Dorothy seam.

A 400-tph washing plant erected in 1945 at Shamrock No. 1 mine, Kayford, W. Va., served as a pilot plant for the Ceredo design, based



LAUNDRY WASHERS (center and left) clean the $\frac{3}{8}$ " at Ceredo. The scraper elevator at the right moves the coal into the dryers.



TEN VERTICAL-SCREEN-TYPE CENTRIFUGAL DRYERS handle the entire drying job at the Ceredo plant.

Centrifugal Equipment Handles Entire Drying Operation

on preparing either the No. 2 Gas coal for metallurgical use or the Dorothy for steam. Both are low-sulphur coals, and the particular problem is to remove an intermediate-gravity high-ash splinty fraction from the metallurgical grade.

● **Ceredo Highlights**—Rated at 800 tph and built by McNally-Pittsburg, the new Ceredo plant is located on a 105-acre tract along the south bank of the Ohio River and employs three McNally-Norton automatic jigs for washing 5x $\frac{3}{4}$ and a Rheolaveur plant rated at 290 tph for cleaning $\frac{3}{8}$ x0. Drying is done by McNally-Carpenter centrifuges. Plant greasing is simplified by an Alemite system delivering to filling stations, or "grease bars," on all floors. Total connected load of the plant is close to 5,000 hp.

Railroad yards, car-dumping equipment, preparation plant and office are protected from Ohio River floods by the Ceredo-Kenova flood wall, one corner of which had to be relocated by the coal company to enlarge the protected area. This wall protects the plant to a flood level of 69 ft, which is approximately 3 ft higher than the record of 1937.

● **Handling Incoming Coal**—Tracks built with 135-lb rails on cross-ties normally accommodate 200 cars of raw coal inbound and 150 cars of outgoing empties or prepared-coal loads. The coal company does its own switching. Loads of raw coal move by gravity on a 1 $\frac{1}{2}$ % grade through a Heyl & Patterson single-car rotary dump, which can accommodate cars up to 90 tons capacity with sides as low as 7 ft. Using hand brakes, the rider controls the speed into the dump and thus the bump required to push the empty off. Maximum possible dumping speed is one car every 100 sec, which is over twice the rated capacity of the plant.

● **Crushing and Picking**—Raw coal from the 200-ton hopper under the rotary dump is elevated to the picking-and-crushing house by a 60-in flight conveyor, fed by reciprocating feeders with variable-speed drives. As the coal passes over a main shaker 8 ft wide, the 5x0 drops through a section of bar screen to by-pass the picking tables and crusher. The remainder is picked by two men on a blind-plate section and then passes over another bar-screen section, dropping additional fines to the by-pass as the lump moves into the crusher. This crusher is a McNally-Pitts-

burg double-roll Gearmatic unit reducing the feed to an 8-in top size. It is protected by shear pins and is driven by a 100-hp 900-rpm motor fitted with plugging-switch control. Bars in the last section of the shaker screen can be removed to by-pass all the lump in case raw mine-run is to be loaded into barges.

The hand-picked and crushed coal is elevated 64 $\frac{1}{2}$ ft vertically to the washer by a 54-in inclined belt conveyor 391 ft long equipped with U. S. Rubber belting and Webster idlers with Timken bearings. Normally this belt discharges to raw-coal screens. A by-pass belt, however, permits routing the raw coal to the mixing conveyor and thence to the river.

● **Raw-Coal Screening**—The raw-coal screens are the balanced-section type 9 ft wide, steel-rod suspended, rigid pitman, 6-in total stroke, 120 rpm. They size the feed to 1 $\frac{1}{2}$ x0, 2x1 $\frac{1}{2}$, 5x2 and 8x5. The smallest size (1 $\frac{1}{2}$ x0) goes to four Robins 6x12-ft Gyrex vibrators, each rated at 160 tph, for separation into $\frac{3}{8}$ x0 for the Rheolaveur washer and 1 $\frac{1}{2}$ x $\frac{3}{4}$ for the fine-coal jig. Oversize (8x5) from the raw-coal screens is broken to minus 5-in by a 36x48-in McNally-Pittsburg Gearmatic crusher. The product joins the 5x2 enroute to the coarse-coal wash-box.

● **Jig Operation**—Both the fine- and coarse-coal boxes are new six-compartment units—the first of that design to be installed. Each box has two cells in the primary and four in the secondary.

Secondary or middlings products from both fine- and coarse-coal boxes are crushed in a 36x48-in Gearmatic breaker for further treatment in a McNally rewash box handling 1 $\frac{1}{2}$ x0. This five-cell box has a two-cell primary and a three-cell secondary.

The 1 $\frac{1}{2}$ x0 primary product (steam coal) from the rewash box moves to a 5x14-ft double-deck Robins Eliptex vibrator, separating the feed into 1 $\frac{1}{2}$ -in-x4-mm, which joins the steam coal, and 4-mm-x0, which travels to the washer. The vibrator has 3/16-in square openings on the top deck and 4-mm wedge wire on the bottom deck.

Secondary material from the rewash box goes to an American ring mill reducing the 1 $\frac{1}{2}$ x0 to $\frac{3}{8}$ x0 for addition to the Rheolaveur feed.

Washed coal from the fine- and coarse-coal boxes is dewatered and classified on shaker screens 9 ft wide and rated at 450 tph. A typical separation by this screening

unit is 5x3, 3x2, 2x1 $\frac{1}{2}$, 1 $\frac{1}{2}$ x $\frac{3}{4}$, $\frac{3}{8}$ x $\frac{3}{4}$ and $\frac{3}{8}$ x0.

Still another crusher can be cut into the washed-coal circuit to reduce the 5x3 and the next smaller size to 1 $\frac{1}{4}$ for the stoker market. This crusher, 36x60 in, is another Gearmatic unit rated at 300 tph. To size the coal from this crusher, three 5x12-ft double-deck Robins Gyrex vibrators are installed.

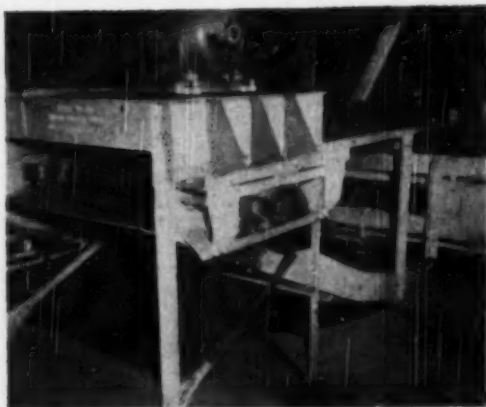
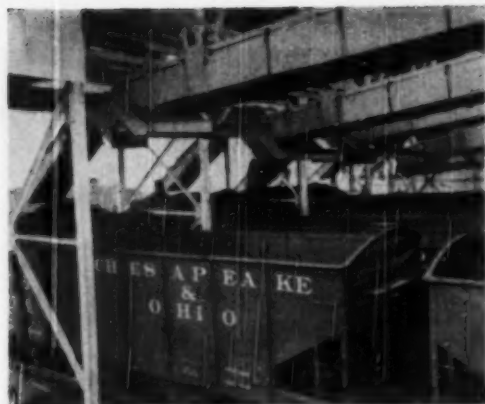
● **Lauder Operation**—Two McNally-Rheo free-discharge units wash the $\frac{3}{8}$ x0 and other fines. Each unit, rated at 145 tph, consists of five inclined launders with Rheo boxes and refuse-collecting sluices in vertical assembly.

The "A" or top launder is 74 ft long, including a 15-ft classifying section discharging to four parallel lanes 14 in wide and 59 ft long. Next below is the "B" launder, 74 ft long with 8 ft of classifying section and four 10-in lanes. Launder "C" is 59 ft long, including 8 ft of classification and two 14-in lanes. Total length of "D," with two 10-in lanes, is 49 ft, while that of "E," the lowest, with one 14-in lane, is 36 ft.

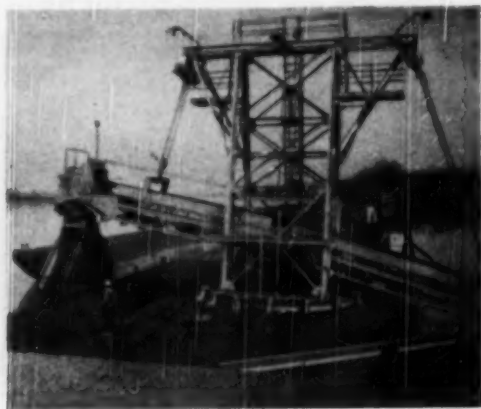
Products from C, D and E are recirculated to the raw-coal feed as regulating material. Metallurgical coal from A, B and C goes to two 18-ft cones converging to elevator boots, while steam coal from D and E goes to a 12-ft cone and elevator boot. Perforated bucket elevators deliver to two drag conveyors, discharging in turn to two other drag conveyors each feeding a line of five centrifugal dryers.

● **Centrifugal Drying**—The capacity of the centrifugal coal dryers, which are McNally-Carpenter vertical-screen units, is 35 tph each of $\frac{3}{8}$ in-x4 mm. Each is driven at 385 rpm by a 40-hp high-torque motor. Two handle steam coal and the others metallurgical. However, the scraper-conveyor and valve design permits rearrangement to feed either size to any desired number of dryers.

The effluent material, which originally went to the refuse, is now being taken back to the raw-coal wetting cones. From lips near the tops of these cones this effluent material, and any other 14- to 150-mesh coal, will be picked up with cyclone thickeners, known in Europe as Driessen cones. At the time of this writing, operating tests in the plant had been carried on with an experimental cyclone thickener and vacuum filter, and an order had already been placed with Heyl & Patterson, Inc., for six 14-in cones.



RAIL LOADING—Five covered scraper-type booms (left) are fitted with motorized back chutes. At the right is the tail end of the No. 3 (2x1/4) boom, with metallurgical mixing conveyor between top and bottom runs.



RIVER LOADING—Retractable shuttle-belt conveyor (left), clearing the 18-ft floodwall by 5 ft, feeds to a dock belt conveyor (right) hinged at the center, with the two ends controlled by independent hoists. A pants chute distributes the coal in the barges.

The Ceredo Story

2. Loading Design Service

Equipped for Rail and River Loading, Ceredo Plant Includes Retractable Shuttle Belt, Refuse Pumping, Special Fresh-Water Facilities, Dustproofing and Freezeproofing, Grease Bars, Noise Reduction and Laboratory

ROUNDING OUT precision crushing, screening, cleaning and drying equipment, the Ceredo central preparation plant of the Truax-Traer Coal Co., Ceredo, W. Va., is

equipped to load either to railroad cars on the Chesapeake & Ohio Ry. or, via retractable belt conveyor and floating dock, to barges on the Ohio River. Four mixing conveyors pro-

vide complete flexibility in shipping metallurgical and steam coal.

Refuse disposal is handled by trucking and pumping. The fresh-water pump is wheel-mounted for movement in accordance with changes in water level. The coal can be dustproofed with oil and freezeproofed with calcium chloride. Plant design included facilities to minimize dust and noise and to insure efficient lubrication through "grease bars" on each floor.

● **Railroad Loading**—Six railroad-

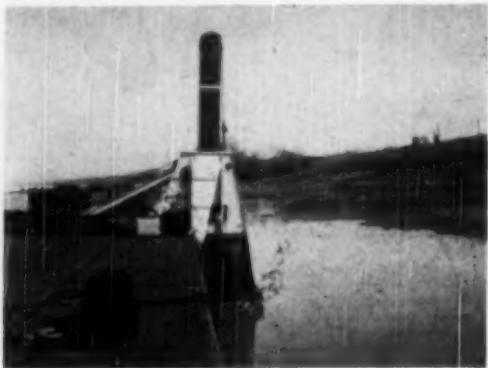
Shuttle-Belt Conveyor Delivers Coal to River for Barge-Loading



DRIVE AND COUNTERWEIGHT for the shuttle belt is shown on the trestle in the view at the left. At the right is a close-up, with the hoist in the control station in the background. Four runs of the hoist rope show between the rails in the foreground.



COAL FLOWING TO THE RIVER at a rate of 800 tph. The track at the right of the shuttle belt is for hoisting supplies.



POWER SPUD—one of the three in use—walks the dock in and out as the level of the river rises and falls.

loading tracks serve the Ceredo plant. Five are equipped with 54-in 400-tph drag-type covered booms equipped with hoists. The sixth track is provided with a 54-in stationary boom with pants chute. All movable booms are fitted with motor-operated back chutes for changing cars without stopping. These often are used to divert the coal farther back if a car fails to move soon enough when released by the retarder. Booms are of the bottom-delivery type, eliminating the drip-page problem.

Four mixing conveyors are installed. A metallurgical mixing conveyor, a steam mixing conveyor and a main mixing conveyor all cross between runs of the loading ends of the booms and are supplemented by a final mixing conveyor at the discharge end. All four are equipped to carry coal on the top

and bottom runs. Numerous valves provide complete flexibility in mixing and loading any grade or combination. Booms are handled by 5-ton Shepard-Niles hoists.

• **River Loading**—Unique for the river loading of coal is a retractable or shuttle conveyor system for coping with the wide fluctuations in river level. Rises of 40 ft above the normal 9-ft pool stage are to be expected, and the loading can be continued to a level of approximately 48 ft, where river navigation must cease because of reduced clearance under highway and railroad bridges.

An inclined track, on a 70-in gage, extends from pool stage to the top of the flood wall and continues on a trestle to the preparation plant, where it parallels the final mixing conveyor. This track

carries the structure of a 48-in shuttle belt conveyor 370 ft long between centers and equipped with a Goodrich belt. Each section is 24 ft long and is coupled to the adjoining section by a hinge shaft where a pair of flanged wheels supports the adjoining ends of two sections.

The entire belt conveyor is wheeled back up the incline and onto the trestle and tippie structure as the water level rises. This movement is handled by a rope hoist (made by the Clyde Iron Works) as if the conveyor were a train of mine cars on a slope. Locking into operating positions is accomplished by attaching clamps to the rails. The $\frac{3}{4}$ -in wire rope is threaded in double-block fashion, thus providing a 4:1 reduction.

• **Dock Operation**—The shuttle



TRUCK-MOUNTED PUMP HOUSE for fresh water is shown being moved at the left. The men are clamping hooks on the rails at the new location. Cap has been removed from tee ready for new connection. A longer length of the fresh-water line is shown at the right.



FIVE RECIRCULATING PUMPS with 125-hp motors normally supply units as follows: launders, one; wash boxes, three; standby, one.

TWO VERTICAL-TURBINE pumps rated at 1,250 gpm each dewater seepage sump under the floor in the main plant.

conveyor discharges to a dock conveyor which elevates to the barge-loading chute. The dock, consisting of two wooden barges lashed end-to-end with wire ropes, is equipped with three Bucyrus-Erie spuds. These spuds are adjustable as to angle. Therefore, the dock can be walked in or out as the water rises or falls. The dock is moved up and down river by a headline operated by a Bucyrus-Erie single-drum winch, and the barges are spotted with another scow winch of the same make.

● **Refuse Disposal**—Refuse from the three wash boxes handling coarse and fine coal is fed onto an Allis-Chalmers 4x8-ft Ripl-Flo vibrator, from which the plus 1½ goes to a truck-loading bin and the minus 1½ to a sump. This sump also receives the refuse from the

Rheolaveur washers. From the sump, which is a steel cone, two Type G Morris pumps working through 10-in lines with Dresser couplings (one line and one pump are standbys) move the refuse to the primary settling pond. Each pump is driven by a 250-hp motor.

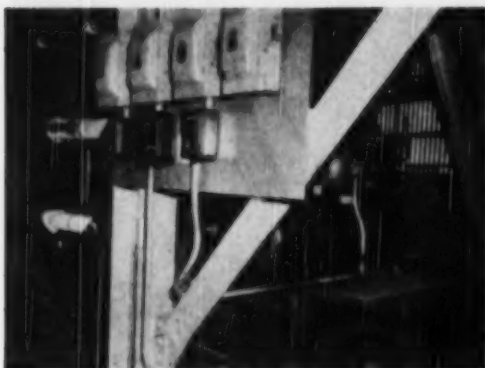
Transfer of the refuse-disposal duty from one pump to another is done automatically if the operating pump stops. After suction-line guillotine valves operate to effect the transfer, the other Morris pump starts and takes over the job. The guillotine valves are held open by stall-torque motors and are closed by gravity.

The property acquired by the coal company includes a 10-acre borrow pit excavated some years ago to make a fill for adjoining U. S. Highway 60. Using clay and refuse from the picking tables,

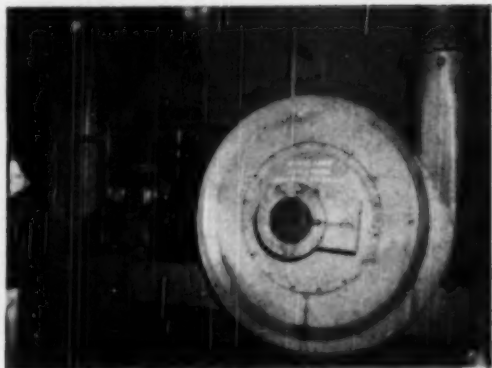
hauled by Euclid trucks, the company has built dams to convert the area into a series of four settling ponds. These thoroughly clear the water before it empties to Twelve Pole Creek at a point near its confluence with the Ohio.

● **Fresh-Water Supply**—Pumping the fresh-water supply for the plant from the Ohio River also is complicated by the great variations in river level. Therefore, a plan involving an incline track and a pump house on wheels was adopted. In the pump house are three Gardner-Denver bronze-fitted double-suction pumps. Each pump is rated at 1,700 gpm against a 120-ft total head and is driven by a 75-hp 1,750 rpm motor. The pump house, which is 16x20 ft and is carried on a 7½-ft gage truck with 14-in diameter wheels, is moved up and down

Complete Laboratory Rounds Out Ceredo Service Facilities



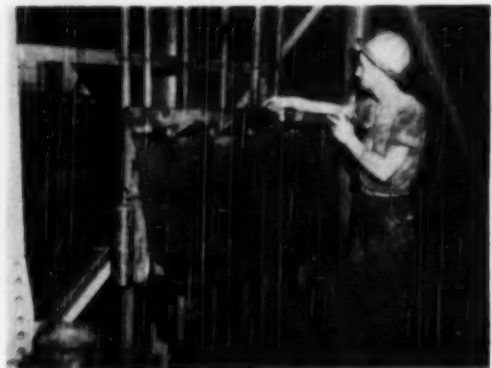
DUSTPROOFING of any size of mixture can be achieved from 14 treating points served by this pumping unit and controls.



WASH-BOX BLOWER with, at the left, a variable-speed unit driving the impulse air valve for the unit.



SERVICE EQUIPMENT includes wetting-compound pump (right), four oil and grease pumps and air compressor (left).



FILLING A GREASE GUN at one of the six service stations, or "grease bars," installed on various floors in the Ceredo plant.

the incline by a single-drum hoist supplied by the Clyde Iron Works, Duluth, and powered by a 10-hp motor. A $\frac{3}{4}$ -in wire rope with one end anchored at the hoist house is arranged double-block fashion. Thus four ropes take the load and the track speed is one-fourth the rope-winding speed.

The main discharge line paralleling the track along the incline is 12-in steel pipe with gate valves and tees 30 ft apart. The side opening of each tee is closed with a cap attached with a Victaulic coupling. For each 10 ft of river rise the house is moved up to the next tee, and the discharge line from the pump house to the incline line is reconnected by a Dresser coupling, which permits a wide degree of misalignment. A steel tank on the floor in the preparation plant stores

a 23,000-gal supply of river water.

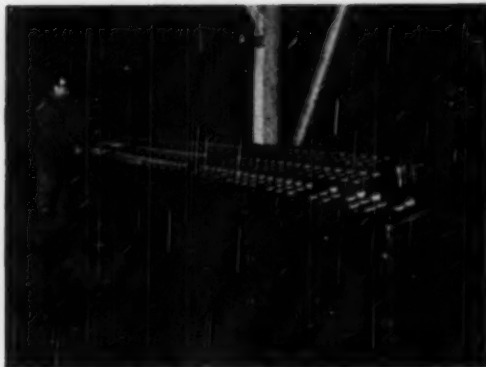
• **Recirculation and Make-Up**—Recirculation of wash water to the three wash boxes and two Rheo units is handled by five 3,000-gpm McNally-Pittsburg pumps with 125-hp 1,200-rpm motors. Normally one pump supplies the Rheo units, three supply the wash boxes and one serves as a standby.

Spray and make-up water from the river storage tank is pumped to a head tank by three Ingersoll-Rand single-stage double-suction pumps driven by 75-hp 1,750-rpm motors.

Two floor sumps are installed in the plant, one receiving seepage from the adjoining yard and the other accumulating overflow and other water from the plant. The seepage sump is dewatered by two Worthington two-stage vertical tur-

bine pumps driven by 50-hp 1,150-rpm motors and delivering either to the river or the river-water tank. The floor water is pumped to the refuse sump by a 3-in Hazleton vertical sludge pump. A unit of the same make and size is installed at a sump in the pit under the rotary dump hopper.

• **Dustproofing and Freezeproofing**—A Viking oil-treating system with 14 treating points is installed to dustproof any size of coal, including 5x3. Permatreat, furnished by the Ashland Oil & Refining Co., is used. Freezeproofing, with 1.35 specific gravity calcium chloride from the Fuel Process Co., Charleston, can be done at 10 points equipped with Fuel Process Type 51 sprays. Plant dust is minimized by water-mist sprays, supplied with



CABINET at the left is one of eight housing the controllers in the Ceredo plant. The equipment is started by pushing 82 buttons arranged in position sequence on the console-type board at the right.



CEREDO OFFICE AND LABORATORY BUILDING (left) includes showers for managerial personnel. The modern laboratory (right) is staffed by a chief chemist and three assistants, and includes all new equipment for testing purposes.

city water and installed at several points in the picking and crushing house and at the raw coal screens.

Roofs of buildings are flat and are covered with gypsum plank protected by felt-and-asphalt built-up roofing with a gravel coating. Sides are covered with corrugated galvanized steel. Steam heat is supplied by an Erie City 200-hp water-tube boiler fitted with an overfeed stoker made by the William Bros. Boiler & Mfg. Co. The heat is distributed by 32 1½ in. Electric Ventilating Co. unit heaters. Conveniences in the main building include shower rooms for the workmen.

• **Lubrication**—Greases and oils in five grades for plant lubrication are delivered to each of five stations on several floors by three Alemite

Volume Motor pumps and two Alemite Low Pressure barrel pumps. The discharge lines distributing to the stations are 1½-in. galvanized pipe. The stations themselves consist of drained sinks with back splash boards where cans and grease guns are filled. Compressed air to operate the oil and grease pumps and certain other plant auxiliaries is supplied by an Ingersoll-Rand Type 30 air compressor, size 5x5x3½x4 in.

• **Noise Reduction**—Plans for the plant called for a relatively low noise level. This was achieved in large measure by using enclosed reduction gear units wherever practicable. Most of the larger gear units were furnished by the Falk Corp. Other units were made by the Cleveland Worm & Gear Co.

Several Reeves variable-speed drives are used in the plant. Each of the four scraper feeders from the 100-ton ¾x0 raw-coal bin is driven through a clutch and a Reeves unit from a line shaft. Each wash box has a Reeves drive on the shaft operating the air-impulse valves. Pan feeders under the car-dump hopper also are Reeves-equipped. Air for the wash boxes is supplied by Ingersoll-Rand high-speed single-stage blowers.

• **Motors and Controls**—Practically all motors and controls for the plant were furnished by the General Electric Co. Principal motors (440-volt) total 169. The largest are 250 hp, and the connected load for the plant now totals 4,858 hp. The eight General Electric Cabinets are placed near load centers

Ceredo Equipment List—Units Over 2 Hp.

Unit and Number in Use	Motors			Drive
	No.	Hp.	RPM	
Rotary dump	1	75	900	Falk gear rod.
Reciprocating feeders (2)	2	18	1,800	Reeves & V-belt
ROM Conv. No. 1 (scraper)	1	800	900	Falk & R. chain
ROM shaker No. 1	1	15	900	V-belt
Double-roll breaker	1	100	900	V-belt
ROM Conv. No. 2 (54-in belt)	1	100	1,200	Falk & R. chain
ROM shaker No. 2	1	40	900	V-belt
Scraper conv., 1½-in coal	1	75	1,750	R. chain
Scraper conv., 1½-in	1	15	1,745	R. chain
ROM scraper to vib.	1	50	1,800	Falk & R. chain
6412 vib. (4)	4	10	1,800	V-belt
Scraper conv. to washer	1	40	1,800	Falk & R. chain
ROM crusher	1	60	900	V-belt
Coarse-coal-jig primary elev.	1	5	45	R. chain
Coarse-coal-jig middlings elev.	1	5	45	R. chain
Coarse-coal-jig impulse valves	1	2	1,800	Reeves & R. chain
Coarse-coal-jig blower	1	75	3,600	Direct
Fine-coal-jig primary elev.	1	5	45	R. chain
Fine-coal-jig middlings elev.	1	5	45	R. chain
Fine-coal-jig impulse valves	1	2	1,800	Reeves & R. chain
Fine-coal-jig blower	1	30	3,600	Direct
Middlings crusher	1	5	1,200	Reeves & F. belt
Middlings scraper conv.	1	60	900	V-belt
Middlings scraper to rewash box	1	15	1,800	Falk & R. chain
Calcium-chloride pump	1	5	3,500	Direct
Rewash-jig primary elev.	1	5	45	R. chain
Rewash-jig middlings elev.	1	5	45	R. chain
Rewash-jig impulse valves	1	2	1,800	Reeves & R. chain
Rewash-jig blower	1	30	3,600	Direct
Washed-coal classifying screen	1	30	900	V-belt
Scraper loading booms (6)	6	40	1,800	Falk & R. chain
Back chutes (5)	5	5	1,800	Falk & R. chain
Butterfly gates on booms (5)	5	5	1,800	Cl. gear
Main mixing conv. (scraper)	1	125	1,200	Falk & R. chain
Stoker crusher	1	75	900	V-belt
Scraper to stoker vib.	1	40	1,800	Falk & R. chain
Stoker vib. (3)	3	10	1,800	V-belt
Steam-coal mixing conv.	1	20	1,800	Falk & R. chain
Steam-coal vib.	1	15	1,740	V-belt
Washed-coal transfer scraper	1	75	60	R. chain
Middlings pulv. to launders	1	75	1,800	V-belt
Fine-coal feeders to launders (4)	1	30	1,800	Falk-Reeves & R. C.
Fine-coal scraper conv.	1	20	1,800	Falk & R. chain
Fine-coal dew. elev. to launders (2)	2	40	1,800	Falk & R. chain
Met.-coal dew. elevs. from cone (2)	2	15	1,200	Reeves & R. chain
Fine-coal dew. elev. from cone	1	15	1,200	Reeves & R. chain
Met. scraper conv.	1	75	1,800	Falk & R. chain
Met. conv. to dryers	1	10	60	R. chain
Steam-coal dew. elev. from cone	1	15	1,200	Reeves & R. chain
Dryer dist. convs. to dryers	1	75	60	R. chain
Centrifugal d-ryers (10)	2	25	1,800	Reeves & R. chain
Dry-coal convs. to met. mixer (2)	2	40	900	V-belt
Dry-coal conv. to met. or st. mixer	1	75	60	Falk & R. chain
Dry-coal conv. to st. mixer	1	10	60	R. chain
Met. mixing conv. (scraper)	1	60	1,800	Falk & R. chain
Outside mixing conv. (scraper)	1	200	900	Falk & R. chain
Refuse scraper from washers	1	20	1,800	Falk & R. chain
Refuse vib.	1	75	900	V-belt
Centrifuge effluent vib.	1	10	1,800	V-belt
Refuse pumps (2)	2	250	860	V-belt
Recirc. pumps (5)	5	125	1,200	Direct
Drainage pumps (2)	2	50	1,500	Direct
Bilge pumps (2)	2	75	1,800	Direct
Spray-water booster pumps (3)	3	75	1,750	Direct
Fresh-water supply pumps (3)	3	75	1,750	Direct
Service hoist (5-ton)	1	75	—	Gear motor
Condensate pump	1	15	3,600	Direct
Air compressor	1	15	1,800	V-belt
Pump-carriage hoist	1	10	1,200	Gear
Boiler blower	1	160	5	Direct
Boiler auxiliary blower	1	3	3,500	Direct
Hot-oil system	1	3	1,150	Direct
Hot-oil spray pump	1	3	1,160	Direct
Heating-oil pump	1	2	1,140	Direct
Treating-oil unloading pump	1	3	1,180	V-belt
Priming pump, river station	1	2	3,475	Direct
Barge Loading:				
Rew-coal transfer belt	1	20	1,765	Falk & R. chain
Conv. from mixer to shuttle conv.	1	25	1,775	R. chain
Shuttle conv.	1	50	1,175	R. chain
Hoist for shuttle conv.	1	10	1,830	Gear
Barge-loading conv.	1	40	1,175	R. chain
Barge-loader revolving chute	1	4	2,600	Shep.-Niles
Hoist, head end barge loader	1	15	1,200	Direct
Hoist, tail end barge loader	1	10	1,800	Direct
Barge-loader turntable	1	25	1,025	Direct
Hoist for supply car	1	10	1,080	Gear
Barge-manuevering winch	1	15	805	Gear
Hoisting winch	1	20	765	Gear
Walking spuds (hoist) (3)	3	10	1,595	Gear
Walking spuds (walkers) (3)	3	5	1,580	Gear

and are not in separate rooms. Capacitors of the same make and installed at each Cabinetrol correct power factor, thereby reducing voltage drop, cutting line and motor losses and effecting a saving in the power bill.

The plant is started by pushing 82 buttons arranged in position sequence on a bench panel. Loading booms, car retarders, back chutes, etc., are controlled from two small bench boards in an operating booth overlooking the booms.

Power is purchased from the Appalachian Electric Power Co. at 2,300 v and the company owns the step-down transformers. The substation, within 25 ft of the main building, includes nine 333-kva General Electric self-cooled transformers. Distribution at 440 v to the track-mounted river pump house and to the walking dock consists of three-conductor rubber cables which trail on the inclines.

A shorter three-conductor cable with a plug for attachment at receptacles installed at three points along the top end of the track powers the drive motor of the retractable belt conveyor. Plugs and receptacles were furnished by the Russell & Stoll Co.

• **Office and Laboratory**—A one-story building of the modernistic flat-roofed broad-eaved type provides commodious facilities for the plant offices, a coal-testing laboratory and showers for the management. Laboratory equipment, purchased new for this job, includes four Hoskins furnaces (two muffle, one quick-ash and one low volatile), two Fisher desiccators, two Christian-Beckner Chainomatic balances, one single-valve Parr oxygen-bomb calorimeter and a Barrett ash-fusion furnace.

Sixty-three men comprise the total payroll for the plant, including the office, laboratory and the recently completed barge-loading terminal. Twelve men, including oilers and night-maintenance men, are employed in the main building.

L. S. Edie is superintendent of the Ceredo plant. Other management men are: George Fraser, assistant superintendent; W. G. Gerow, plant engineer; J. M. Bishop, chief chemist; J. O. Westlund, office manager; B. H. Rees, plant foreman; Gus Gunther, night maintenance foreman; and Dale Massie, yard foreman. During the construction period J. M. McCoy, now stationed at the company's mines at Kayford, W. Va., was resident engineer, Mr. Gerow his assistant.



ENGINE-GENERATOR SET in place of one tray of the standard battery would provide self-contained and continuously available power for shuttle cars and other mobile equipment under proposed new system.

New Power for Haulage?

WHAT IT IS . . .

Engine, Generator, Half-Sized Battery, Controls and Protective Equipment Replacing Standard Battery

By J. F. HENSLEY, Service Engineer, and H. R. TAYLOR, Sales Dept.
Pittsburgh Branch, The Electric Storage Battery Co.

THE PURPOSE of this article is to describe a power system—new so far as present-day practice is concerned—for the continuous operation of shuttle cars and other electrically-propelled vehicles, particularly in mining.

There are two types of power for such vehicles in present general use:

1. Cable-reel power, where all motors derive power from the mine trolley, usually 275 v dc, through a cable on a motor-driven reel mounted on the car.

2. Storage-battery power, where all motors operate from a battery carried on the vehicle, usually in two sections or trays, one on each side between the wheels.

Advantages and Disadvantages—Each type of power has disadvantages in mining, and as users ac-

WHAT IT OFFERS . . .

Possibility of Self-Contained and Continuously Available Power for Shuttle Cars and Other Mobile Units

quired experience there was a growing desire for a power source or system that would eliminate these disadvantages to the greatest degree. Today, with the continuing development and expanding use of such equipment, there is a definite need for a self-contained, fully in-

dependent and continuously operating power source.

It was to determine the possibility of developing such a power system for mining equipment that the Pittsburgh branch of Exide made tests and studies over the past 2 yr. As a result, the system about to be described is offered as a method of providing electrically propelled vehicles with a continuously operating, self-contained and fully independent power source eliminating the principal disadvantages of other systems at reasonable cost.

The proposed engine-generator-battery power system may be applied to any electrically propelled vehicle, such as a locomotive, tractor, timbering machine or shuttle car, whether powered at present by a storage battery, an engine-generator unit, electric trolley or cable, or a combination.

How the New Power System Is Set Up for Haulage

The elements of the proposed power system are:

1. An internal-combustion engine (diesel, gasoline, propane, etc.).

2. A dc generator of proper characteristic (such as diverter-pole, regulated-shunt-wound, etc.) continuously connected to:

3. A storage battery permanently mounted on the vehicle.

4. Suitable control and protective

elements for the engine, generator and battery (engine governor; overload and reverse-current protection for the generator; possibly "TVR" control to idle the engine when the battery reaches a specified state of charge, etc.).

5. For inside-mine use, flame arresters on engine intake and exhaust meeting USBM requirements.

6. For inside-mine use, a gas-

How New Engine-Generator Power System Operates and What It Offers

scrubbing system meeting Bureau of Mines requirements for absorbing the noxious and toxic elements in the exhaust fumes; also, possibly, a means of oxidizing any carbon monoxide in the exhaust chemically in the scrubber.

7. A fuel-storage system that might utilize some of the exhaust heat for preheating the fuel oil for increased efficiency.

Design for Haulage Service—

The engine would be operated at a constant speed, controlled by a centrifugal governor. These governors provide a speed control of about 3% of preset value, which would appear to be ample.

The generator, direct-connected to the engine, would be designed with the proper volt-ampere characteristics.

A diverter-pole generator, or a shunt-wound machine with either suitable inherent taper or, possibly, external regulation, would seem to be suitable.

The engine, generator and battery would be properly matched to each other with respect to horsepower, generator rating, number of cells and rating of cells 'n ampere-hours, and the system comprising these three elements would be properly matched to the energy requirement of the vehicle.

How the New Power System Functions in Operation

To describe the operation of the proposed system we will speak of it as applied to a conventional battery-type shuttle car. Such a car commonly uses a battery of 48 cells, assembled in two steel trays with covers. The rating is 300 amp-hr and 28 kw-hr at the 6-hr rate. In the average mine this battery is required to furnish about full rating, or 28 kw-hr, to the car's load circuit over a shift of 7 to 8 hr. Obviously, two batteries are required for two shifts of operation in 24 hr.

In the proposed single-battery system, the car would be equipped with a 48-cell battery with about half the capacity presently employed. The battery would be permanently installed on the car in the space on one side now occupied by one tray of a standard battery. Several different arrangements for mounting the battery are possible. The smaller battery could be assembled in two 24-cell steel trays, each about 12 in high, using a low-height cell. The trays could be mounted one on top of the other, with pro-

vision for demounting for adding water to the cells, inspection, repairs, cleaning, etc.

The preferred arrangement would employ 48 cells in a single tray, using a higher cell with a rating of 150 or 200 amp-hr, making the tray about 24 in high as at present. Also, it would be possible to operate the system at 48 v nominal, using a single 24-cell tray and a larger cell providing equivalent kilowatt-hour capacity.

On the other side of the car, in place of the present second 24-cell tray, the engine-generator unit with associated control and protective equipment, and perhaps the exhaust system if space permits, would be installed.

Shuttle-Car Requirements—Assuming a generator capacity of 5 kw and an engine rating of 7.5 hp, the engine-generator set theoretically could produce 40 kw-hr of energy over an 8-hr shift, assuming that during this time the battery could absorb energy at the full-load current of the generator. This 40 kw-hr is well in excess of the power requirements of the car over a shift. The physical size of such a set would be rather small, and it should fit in the space now occupied by a 24-cell tray.

The generator would be continuously connected to the battery and load circuit, and would furnish power as required, as regulated by the engine governor, the inherent characteristic of the generator and the state of battery charge.

The nature of the electrical load of a shuttle car (or other electrically-propelled vehicle) is a rapidly and widely fluctuating one, with recurring current peaks of very short duration. Shuttle cars equipped with two 5-hp traction motors will have intermittent peak loads, of short duration but rapidly recurring, of around 200 amp more or less. Cars equipped with 7.5-hp motors will peak around 300 amp. Stall current will go to around 400 amp, at which point a fuse will blow or the thermal-overload device will function to open the line. Shuttle-car idle time may be almost as great as operating time over a typical shift.

Generator Capacity—The 5-kw generator would be capable of furnishing 40 to 50 amp to the battery and load circuit when and as required. At times when load demand exceeds this value, the generator would furnish full-load rating and the battery current in excess of gen-

erator rating. The battery thus would act as a reservoir, supplying large currents of short duration on demand and storing energy between-times.

This results in a system-governed operation with the battery maintained in the upper portion of its cycle most of the time. With constant engine speed, and a generator of suitable volt-ampere characteristics, it should be possible to engineer satisfactory battery charging under these conditions.

For application to a shuttle car, one of the small air-cooled diesels developed for stationary service might prove satisfactory. Fuel storage should not be much of a problem with a 7.5-hp engine, as it would consume only about 3.5 gal. of oil a shift. Starting of the engine could be simplified by motorizing the generator at reduced voltage through a dropping resistor.

Facilities might also be provided in this system for charging the battery through a resistor from the 275-v dc trolley, if desirable because of engine failure.

As no trial or physical experiment has been made to determine the workability of the system or the requirements of its apparatus, we cannot say whether the components used as examples would be satisfactory in actual practice. Both engine and generator probably would have to be somewhat larger than 7.5 hp and 5 kw because, during some portion of the charging time, the battery will not be able to accommodate safely a rate in excess of normal finish rate. However, even with the battery in the upper portion of its cycle, it should be able to absorb full generator output for short periods following heavy high-rate discharges, as in traction.

What New Power System Offers in Service Haulage

For shuttle cars and other vehicles for inside-mine service, the system offers these advantages:

1. Continuous operation over the shift with complete mobility and flexibility, and without external battery charging and changing facilities and spare batteries.

2. Greater dependability and continuity of operation, because the system will permit limited operation on battery power in event of engine or generator failure. This will permit removal of the crippled car to a repair point, which is not possible with a cable car or a car powered by an engine-generator

unit in event of cable or engine-generator failure.

3. Better voltage and speed characteristics, as the battery will handle large current surges with relatively small voltage drop and will serve to sustain or stiffen the voltage level of the system.

4. Easier solution of the problem of flameproofing the intake and exhaust of the engine and conditioning the exhaust gases. Obviously, this problem would be proportional to the horsepower of the engine and the volume of gas evolved. To apply a straight engine-generator power plant to a shuttle car would require an engine of 35 or 40 hp and a generator with a rating of about 25 kw. In contrast, the engine of the proposed system would be only one-fourth or one-fifth this size, the volume of exhaust gas would be only one-fourth or one-fifth as great, and the problem of flame-proofing the engine and conditioning the exhaust gas would be proportionately smaller. Also, the engine of the proposed system, operating at a more-uniform speed and power output, should permit finer adjustment of combustion for most complete burning of fuel and least monoxide in the exhaust.

Approval Prospects—The Bureau of Mines, in I.C. 7328, emphasizes the need of "some far-safer type of coal-mine haulage that would eventually displace a system using bare trolley wires." The Bureau further states, in I.C. 7406, that if certain specified safety requirements are maintained, "the diesel mine locomotive can be used with reasonable safety (and unquestionably greater safety than trolley electric locomotives), and there is good reason to believe that ultimate haulage costs with diesels will be lower and efficiency higher than with the trolley system."

It seems safe to assume that the Bureau's attitude toward trolley-powered equipment would extend to the cable-reel shuttle car, which has shock and spark hazards of its own. By the same token we would expect the Bureau to be favorable to the use of small diesels (say 7.5 or 10 hp) in the working sections, provided they complied with requirements as to flameproofing and exhaust conditioning, and provided the quantity of ventilating air produced the required dilution of exhaust. Since Bureau regulations permit only a very slight contamination of the air, it follows that a small engine would reduce it to a minimum.

The diesel-powered locomotive has been brought to a high state of development in Europe, particularly in England, and in that country it carries the Buxton certificate, which is the British equivalent of our Bureau permissibility requirement. Thus there is a wide background of use of the diesel in underground service, and a wealth of experience and development is available.

The reader will note certain similarities between the proposed system and the old and familiar battery-oil-electric, or "three-power," locomotives. However, this system proposes to have the engine running at rated speed and the generator and battery, in parallel, connected to the load circuit at all times as the primary power source.

Early Developments—The basic idea is not new. In fact, a search discloses a number of pertinent patents, abstracted as follows, with comments:

1. *Patton*, 409,116 (1889): Improvement in motors for street cars. Gas engine driving dynamo connected to storage battery, providing power to traction motors. Applies closely to the proposed system.

2. *Bergman*, 1,378,514 (1921): Driving system for automobiles. Engine driving generator connected in parallel with battery, powering traction motor. The "new" element in this patent is an electromagnetic fuel-feed device actuating the engine throttle in response to load demand. Basically the same as the proposed system, but the latter proposes to run the engine at constant speed, the fuel feed or throttle being controlled by a centrifugal engine governor. Generator output would be governed by its inherent characteristic.

3. *Arendt*, 1,790,634 (1923): Self-charging electric vehicle. Engine driving generator powering traction motors, with battery augmenting generator at loads in excess of generator ability and taking charge at times of light or no load. The "new" element is a means, called the "watt regulator," of maintaining the power or watt output of the generator at its full rated level; also, provision for reducing output of generator to prevent overcharge or excessive finish rates to battery.

Basically, the idea is the same as the proposed system, except that the latter proposes the use of a diverter-pole generator, or properly adjusted shunt generator, in which the power output would be inher-

ently controlled by adjustment of its volt-ampere characteristic so that at times of heavy load it would contribute its rating to the system, while at times of load less than rating it would handle the load and charge the battery as needed, with its voltage adjusted to prevent excessive current to the battery in event the latter was "up."

4. *Pestarini*, 2,049,388 (1934): Electromechanical power plant for locomotive vehicles, based on an engine-generator-battery power combination controlled by a rotary transformer called a "metadyne," the object seeming to be to secure constant power or watts from the engine-generator (as with *Arendt*). However, *Pestarini* states "In order to reduce the size of the engine, the battery may be arranged to supply energy to the motor during overloads," which is one of the objects of the proposed system.

Basic Principles—Reviewing the preceding, it appears that these patents, as well as the proposed system, all employ a broad basic principle that is old and well-known. What makes each of these patents new and distinctive is a specific control method.

The system described here proposes to accomplish such control by the inherent behavior of a diverter-pole generator, or properly adjusted shunt generator, in parallel with a storage battery and a widely- and rapidly-fluctuating load. Thus, the specific control would reside in the characteristic of the generator itself when paralleled with battery and load. Assuming that it accomplishes the desired results, this appears to be as much a "specific control means" as those employed in the patents summarized previously. However, it would seem that a claim granted on such a basis would be weak and might readily be avoided.

The question of whether this power system is patentable, or can be protected by patent, is, in our opinion, unimportant. What is important is the promise of an improved method of operating shuttle cars and locomotives underground.

We would point out, however, that the system, as yet, has had no trial or experimentation. Nevertheless, we have the experience of previous similar systems, and the behavior of the diverter-pole generator in parallel with a storage battery serving oil-switch and control loads, all pointing to the workability of the proposed power combination.

Pennsylvania Operator Finds Private Plane Profitable Aid to Business



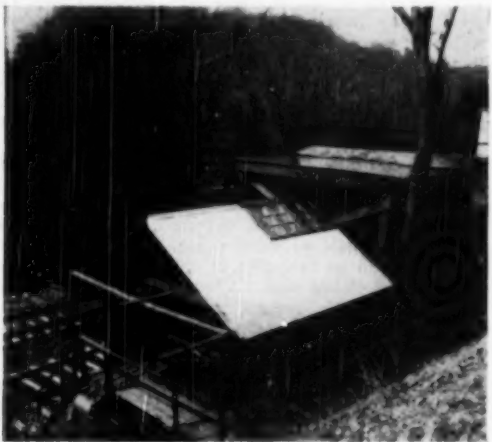
A 590-LB CARGO CAPACITY and 150-mph average speed make George Yostheimer's plane indispensable for long business trips, parts-procurement errands and inspection flights.



THREE MEALS AT PUNXSUTAWNEY, with necessary trips to New York and Detroit between meals, is the record Mr. Yostheimer (right) is reciting to Fred Raffeto and Mabel Casady after dinner.



OVERBURDEN REMOVAL at 1,000 yd per hour is normal duty for this train of tractor-drawn scrapers. A 3-min round trip for scrapers keeps dirt moving off the coal.



SMALL EFFICIENT TIPPLE receives truck-hauled coal in the hopper (right) for picking, screening and crushing. Conveyors (left) are for railroad carloading and waste disposal.



AIR INSPECTION promotes smooth operation as shown in this cockpit view of Mr. Yoxtheimer's first scraper stripping.

The Air Age Comes to the Coal Industry as . . .

Strip Men Fly for Efficiency

"My Ship Pays Its Own Way," Says George H. Yoxtheimer, in Pointing Out That Fast Transportation Gets Equipment Back in Service Quickly and Permits Him to Take Advantage of Good Business Opportunities

AIRPLANES have become a definite asset to strip-mine owners who operate widely separated pits. For example, a Ryan Navion takes its place as an item of major equipment at a strip property near Punxsutawney, Pa., operated by George H. Yoxtheimer, clergyman-pilot-coal operator of Northumberland, Pa.

Mr. Yoxtheimer's varied interests emphasize the value of air service. His career started with his ordination as a Methodist minister, and his endeavor eventually led him to the pastorate of a New York City church. About 20 yr ago he was granted a 1-yr leave of absence for rest and recuperation after a siege of ill health. However, he soon wearied of resting and became interested in highway and bridge construction. So he entered the construction field.

Throughout this period he was a flying enthusiast, and for the past 18 yr has owned and flown his own

ships. In fact, he headed a "flying circus" during the 'thirties in addition to promoting his business and serving as a clergyman in local churches needing his assistance.

When war came he applied his equipment and earth-moving experience to strip mining and has uncovered and loaded coal ever since.

● **How the Plane Pays for Itself—**Let Mr. Yoxtheimer present the case in favor of business airplanes for coal operators. "My Navion," he says, "has paid its own way. The production time we've saved in quickly getting parts for broken equipment has more than paid expenses."

"I recently accepted a spot order for coal. It came about because of a tie-up at another mine while coal was being put aboard a ship for export. Because of the high costs involved in keeping a ship in port, a premium price is paid for enough coal to finish loading. The ship-

ment must go out right on time.

"Our company received the order to supply what was still needed, so we prepared to load. However, our loading shovel broke down. I rolled out the Navion, flew to the shovel factory for the parts and got back in time for the mechanics to repair the shovel and begin loading on schedule. I received the premium price for my coal and have had several repeat orders in similar port emergencies. The whole feat would have been out of the question had I not had my own plane."

In one day he made trips to New York and Detroit for critical parts for his equipment—and never missed a meal in Punxsutawney. Regular business trips to his brokers in Philadelphia and New York, visits to his home in Northumberland and inspection flights to his other strip mine at Gillette, Wyo., 1,400 mi away, are all in a day's work for this flying coal operator. Mr. Yoxtheimer surprised himself one day by watching a shift begin work at his Punxsutawney mine and then seeing the men at Gillette loading coal later that day.

● **Tractor-Scrapers Strip Overburden—**The stripping near Punxsutawney is a tractor-scraper operation supervised by J. J. Moyer Jr., general superintendent. At



FIELD MAINTENANCE handles some big jobs. E. Doverspike (right), chief mechanic, discusses transmission repairs with mechanic W. R. Beck.



DOUBLE-TOOTHED ROOTER breaks up hard overburden to permit easier scraper loading.



ROUNDED SPOIL BANKS are one advantage of scraper mining as these units pick up loads in the pit (left) and haul to the top of the spoil bank (center).

present he is removing 20 to 25 ft of overburden to lift 20 to 24 in of coal from the Lower Kittanning seam. This is getting mighty close to the economic limit, Mr. Yoxtheimer says.

Four Gar Wood 15-yd scrapers are pulled by diesel-powered Allis-Chalmers HD 14 tractors, and similar tractors with reinforced Baker blades push the scrapers to load them to capacity. This equipment train consistently moves over 1,000 yd per hour and 12,000 yd per day is not unusual.

In opening the pit, a 1- to 2-ft layer of clay was scraped off the entire area because it would run off the highwall into the pit when it became wet. Then the scrapers started at the crop line and removed overburden in a 90-ft cut. The highwall is maintained in a

straight line parallel to the general trace of the crop line and the overburden is hauled off the coal by the shortest route. A 3-min round trip is standard practice. The scrapers deposit spoil in rounded-off banks so there is no leveling to be done later.

• **Overburden Shooting Eliminated**—Consolidated shale is the hardest material encountered and is broken up by a tractor drawn rooter. Another HD 14 pushes the rooter and rests its blade on the table of the rooter to add weight. Scrapers handle this material without difficulty and shooting is eliminated. Two Allis-Chalmers road patrols equipped with three-tooth scarifiers clean the top of the coal, and at other times keep the haulage and access roads in good condition.

Two 1¼-yd Lorain 75B shovels load the coal into nine 10-ton Diamond T and International trucks for a 4-mi trip to the tippie and railroad loading point near Anita, Pa. The coal is picked, screened and crushed to minus 4-in and loaded into railroad cars by a portable conveyor. Waste is removed from the tippie and dumped by another portable conveyor.

Three additional bulldozers are used in the pit for moving small amounts of dirt short distances and for trimming the work so that each scraper gets a full load without interruption. Randall Miller, pit foreman, keeps his equipment moving and working effectively.

Maintenance consists of close control of lubrication, effective operator supervision and repairs on the scene.

This is Mr. Yoxtheimer's second successful application of scrapers to strip mining in the Punxsutawney area. The previous operation was described in *Coal Age*, March, 1947.

• **Plane Operation Offers Other Advantages**—The airplane has other advantages for this type of mining. Brush-covered crop lines are more easily spotted from the air, best access and haulage routes can be quickly discovered and inspections are quick and accurate.

In addition to other coal-mine users—both strip and deep—many metal mine operators in the wide open spaces of the west swear by the ability of their planes to promote smoother production and better marketing. Washington, California, Idaho, Nevada and other western states have flying miners now, so it seems the airplane is in the mining industry to stay.

SAFE DEPENDABLE POWER



SPEED UP your haulage and SAVE with EXIDE-IRONCLAD POWER

With Exide-Ironclads in your battery-powered shuttle cars, locomotives and trammers, you get all these time-saving, cost-cutting, tonnage-boosting benefits...

- instant starting and fast acceleration.
- safe, flexible haulage—quick car changes, less idle loader time, higher main line tonnage.
- uniform speeds maintained for entire shift.
- no unscheduled down time, hence more production per man per shift.
- low operating and maintenance costs.
- exceptionally long life.

These advantages are made possible by the construction of the Exide-Ironclad which is different from any other battery. Its superior characteristics and long life—proved in more than 100,000 heavy duty jobs make the Exide-Ironclad Battery the best power buy—at any price.

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 32

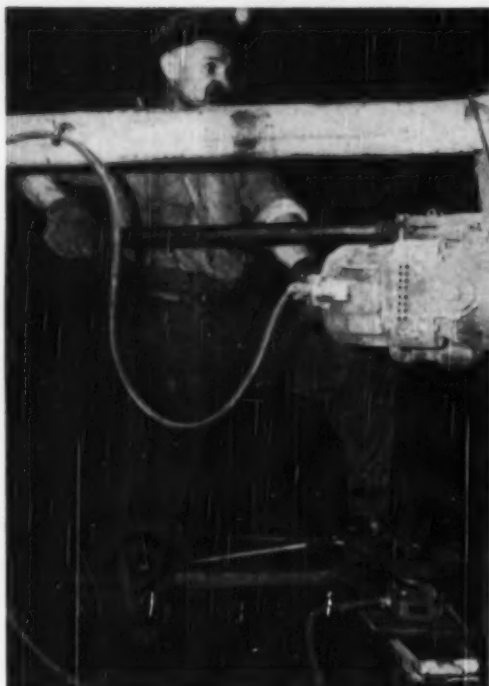
Exide Batteries of Canada, Limited, Toronto

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Foot-Operated Safety Switch Protects Driller



DRILLER MUST STAND on foot-operated switch to keep drill running. In case of trouble, removal of his foot immediately stops the drill and reduces the chance of serious accident.

DRILLING COAL with a post drill or a drill mounted on a boom no longer constitutes a real hazard to the driller at the Willow Grove mine of the Hanna Coal Co., Neffs, Ohio. A new safety switch on which the operator must stand to keep the drill operating minimizes the possibility of a serious accident or fatality from the driller catching some part of his body or clothes on the thread bar or augers. The switch already has prevented two accidents at this mine.

Dewey Jones, superintendent of Willow Grove mine, called a meeting of his safety director and inside foreman to study what could be done about this safety hazard. Mr. Jones came up with the idea of a safety foot switch, similar to the dimmer foot switch in an automobile. He immediately brought in his chief electrician, Robert McCormick, and instructed him to start work on it at once, and to buy or build a switch strong enough to stand up under rough treatment and also give a minimum of maintenance trouble. In a few days Mr. McCormick came up with a switch that fitted the bill. A switch made by the Clark Controller Co., Cleveland, Ohio, and known as the "Rough Neck Foot Switch," was hooked up in conjunction with a contractor mounted on the drill truck and a two-conductor throw cable 20 ft long.

The switch is mounted on a 1-ft-sq board with a 1-in angle along two sides of the board. When the drill is set up, the board with the switch is placed alongside the drill. The driller must stand on the switch before the drill will operate. If by chance the driller is caught in the drill, his foot is automatically pulled from the switch and the drill immediately stops.

The new switch also has cut the maintenance cost of the drills. Formerly, one of the big items was the high maintenance cost of burned out drill switches as a result of shutting the switch off and on under load. This is not necessary now, since the drill switch can be left on and the drill controlled by the foot switch. Drillers took to the new device immediately and no longer have the fear of being caught and wound up in the drill.



Jig Helps Welder Rebuild Dipper Teeth

IF YOUR WELDER finds it hard to wrestle dipper teeth around a flat workbench, you can show him how they are handled by William E. Bishop, welder, Tecumseh Coal Corp., Boonville, Ind. Mr. Bishop has built a special jig to hold dipper teeth while he rebuilds them. As shown in the accompanying photograph, the jig is equipped with adapters that will handle four different sizes and types of dipper teeth. He reports it makes his work easier.

"WORKS FINE," says William E. Bishop about this jig and its adapters built to ease the job of rebuilding dipper teeth.



AMERICAN EXPLOSIVES

used in extinguishing
underground
coal fire



When a vein of hard coal near Pottsville, Pennsylvania, became ignited, a nearby coal mine was threatened with destruction and the city of Pottsville itself became endangered.

AMERICAN Explosives' engineers were called in to direct operations. Through the skillful use of AMERICAN Explosives, approximately 6,500 square feet of overburden was removed from above the underlying seam. The burning coal was then scooped out and soaked with water.

AMERICAN Explosives' engineers have the experience and the know-how... and AMERICAN Explosives have "the stuff" to meet efficiently any field problem. AMERICAN Explosives are available in a complete range of strengths, velocities and densities. They are products of intensive research, quality control and modern manufacturing techniques—your assurance of maximum dependability, speed, and all-around economy.

Capable Field Engineers are Available at Your Call

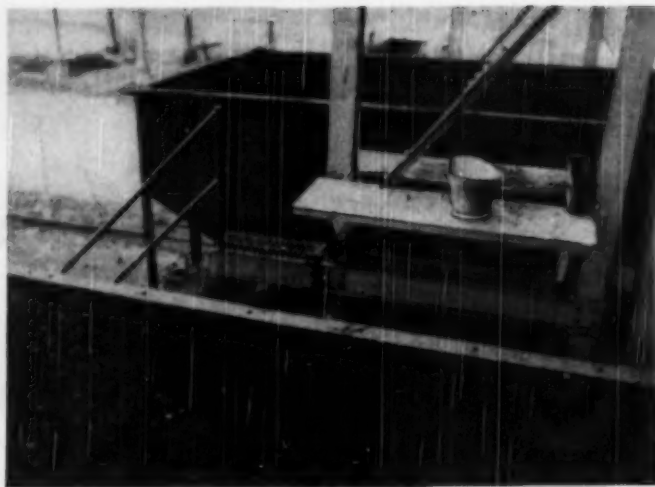
★ High Explosives ★ Permissibles ★ Blasting Powder ★ Blasting Accessories



Sales Offices: Pittsburgh, Pa. • Bluefield, W. Va. • Scranton, Pa.
Chicago, Ill. • Pottsville, Pa. • Maynard, Mass.



STEEL STAIRS AND PLATFORM at loading booms simplify sampling.



PLATFORMS CLOSE to top of railroad car make it easy for sampler to step across to loading boom and fill his sampling bag.



LABORATORY INDICATOR sends messages to twin dial in tippie. Here, lab man talks to tippie operator after turning dial indicator to "Telephone" and flashing red light.



TIPPLE DIAL echoes lab dial and thus shows operator how preparation plant is performing. R. A. Mullins, chief chemist, watches the indicator for a signal.

How Harmattan Speeds Sampling

SPECIAL STEEL STAIRWAYS and platforms at each of the five loading booms and an ingenious communication system between the laboratory and the operating control panel in the tippie make it easy to sample coal every hour and keep a close check on quality at the Harmattan mine, Fairview Collieries Corp., Danville, Ill.

The stairways, about 18 in wide and provided with handrails, lead from the ground level beside the track to steel platforms at a height about even with the top of a railroad hopper

car. From the platform, the man taking the sample steps across the narrow gap between the platform and the car and, with another step or two, arrives at the discharge end of the loading boom, where he catches his sample in a bag. His return to ground level is by way of the same route.

Officials at Harmattan point out that the stairs and platform, in addition to providing safety for the sampler, make his work easier and faster. With five loading booms to work, he soon would fall behind his sampling

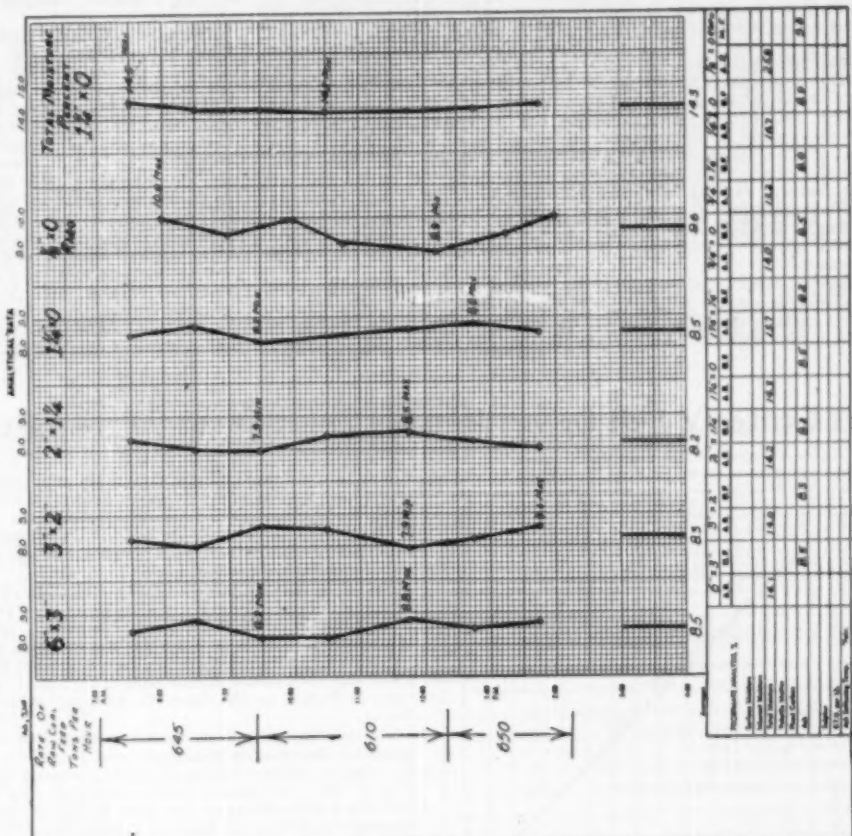
schedule if he had to climb up the sides of five railroad cars, make his way across each car to the end of the boom and then climb down again. Besides, climbing up and down the side of a railroad car requires use of both hands, making it unsafe and clumsy to carry a sampling bag. With the stairway, however, the sampler has an easy climb up and down and needs only one hand to steady himself, the other hand being free to carry his sampling bag.

The steel platforms, welded to steel

Serial June 6, 1949

WATER	FAIR
WIND	28 to 38 mph

DAILY LOADING, RECOVERY, OPERATING AND LABORATORY RECORD

[illegible]

Admiral R. M. M. M.

1000

columns supporting parts of the tippie, are fixed in position close to the end of the loading booms. Thus it is unnecessary for the sampler to walk more than a step or two on top of the loaded coal.

Samples from each of the five loading booms are pulverized immediately and taken to the main laboratory, about 200 ft from the tippie. There, technicians under the direction of R. A. Mullins, chief chemist for Fairview Collieries, divide each sample into halves, running ash and moisture tests right away on one half and putting aside the second half as a composite sample for final tests by ASTM standards.

Laboratory results of running tests are relayed quickly to the tippie-control operator by means of twin shop-built dial indicators run by a

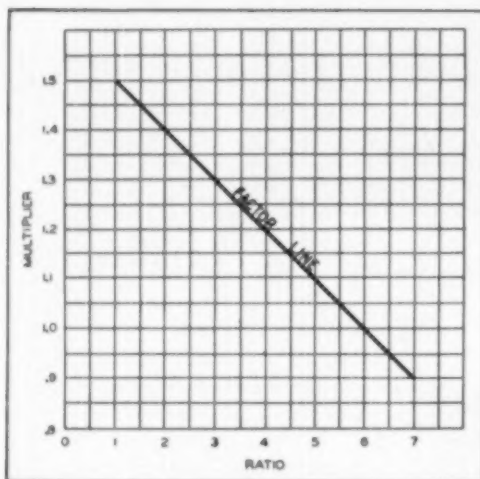
selsyn motor. One indicator is in the laboratory, the other at the tippie-control panel. The twin dials are marked off by different colors into four pie-shaped wedges. One wedge shows percent ash in the Rheolaveur product; another, percent ash in the jig product; and a third, percent of float in the refuse. A fourth wedge in the dial shows that a telephone conversation is needed between laboratory and tippie. The three plant-performance wedges on the dials are subdivided into percentage wedges (9, 10 and 11% ash for the Rheolaveur units, for example) and tenths of one percent are calibrated on the circumference of the dials.

When a test is completed, the laboratory technician turns the pointer on the laboratory dial to the point showing results of the test just completed.

This is immediately echoed by the indicator in the tippie, thus showing the tippie operator how the plant is performing.

Sometimes, of course, ash content of two different sizes of coal is nearly the same, varying only 0.2%. When this happens, the pointer moves very slightly—so little, in fact, that the tippie operator might mistake a report on one size for a report on the next size. To avoid mistakes like this, the laboratory man punctuates his reports with flashes of a red light tied into the system. This light, flashing just above the dial indicator in the tippie, shows the end of a report on one size and the start of a report on another size. The tippie operator, reading the indicator above his control panel, can make the needed changes immediately.

Short-Center V-Belt Drives Provide Economy and Compactness



CENTER DISTANCE CHART: Multiplier times large-sheave diameter equals center distance.

AMONG THE ADVANTAGES of the V-belt drive is its ability to operate on a short center distance. This feature is particularly desirable from the standpoint of economy and compactness, writes F. H. Rumble, Texrope Drive Dept., Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Using the shortest practicable center distance lowers the initial and replacement costs of the belts. It is also easier to maintain proper tension on a short-center drive because there is less belt to stretch and get out of adjustment.

Of course, compactness and space saving can be secured by connecting the prime mover directly to the driven machine, but this is possible only when the speed of the driven machine is the same as that of the driver, and where no shock loads are present. This brings out another advantage of V-belt power transmission. Resilient V-belts absorb peak loads and heavy starting torques without transmitting the shocks to driver or driven machine.

The shortest practicable center distance, or distance between shafts, is the sum of the radii plus enough margin to permit the sheaves to be moved toward each other for

belt installation and changes. A margin of several inches on fractional horsepower drives to several feet on large multiple drives may be necessary. However, the designer is given some leeway because it is not always possible to use the shortest distance. Other requirements of good V-belt engineering must be considered.

Angle of contact of belts on sheaves should not be less than 90 deg to get efficient operation with fewest belts, and restrictions on minimum sheave diameters and maximum belt speeds also must be observed, Mr. Rumble continues.

Considering all these factors, V-belt engineers generally agree that ideal center distance, up to 7:1 sheave-diameter ratio, is from 1 to 1½ times the diameter of the larger sheave.

The accompanying chart has been prepared to assist engineers in determining ideal center distances. It is used in this manner: From the ratio of sheave diameters along the base of the chart trace a vertical line to the factor line, then move horizontally at this level to the left margin of the chart and read the value of a multiplier. The multiplier times the diameter of the large sheave equals ideal center distance.

Examples: Assume that a driven sheave is 30 in in diameter and that the driver also is 30 in. This is a 1:1 ratio. Projecting a vertical line from 1, at the base of the chart, to the factor line, then a horizontal line from this point on the factor line to the left margin gives a multiplier of 1.5. Therefore the ideal center distance is:

$$30 \times 1.5 = 45 \text{ in.}$$

If the driver sheave is 5 in in diameter and the driven sheave is 30 in, the ratio is 6:1. In this instance the chart gives a multiplier of 1.0. Therefore center distance is:

$$30 \times 1.0 = 30 \text{ in.}$$

As a final check, be certain that the arc of contact of belt on the smaller sheave is not less than 90 deg, that belt velocity is not excessive and that minimum sheave-diameter requirements are observed.



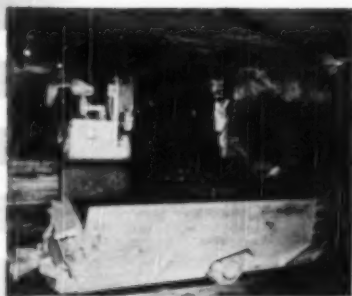
MAYBE YOU'RE A WIZARD at figuring out useful operating ideas, but why be bashful about telling others about them? There's cash in it for you, too, if you send them to COAL AGE. See p. 113.

HAULAGE WAYS Jr.

LOADING POINT N° 3

**"Materially assisted in cutting trip-changing time to
15 to 20 seconds"**

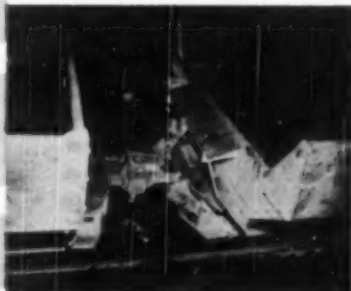
LOADING POINT N° 2



Automatic Mine Car Couplers on 6.92-ton drop-bottom cars facilitate changing trips at shuttle car ramps in 15 to 20 seconds.

Rods extending to either side of the car permit uncoupling without entering the between-cars danger zone.

LOADING POINT N° 1



TO MAIN HAULAGE →

Operation of O-B Automatic Mine Car Couplers was described with these words in a recent trade journal article. The couplers are in service on 100 cars at the Regent Mine of Linton-Summit Coal Company, bringing out a portion of the 3,400 ton total of raw coal per shift. Further description of the operation reads, in part:

EFFICIENCY ACHIEVED IN HAULAGE

Mine car loading averages 6.92 tons. The total of 100 cars . . . is equipped with Ohio Brass Automatic Couplers, which have increased haulage safety and materially assisted in cutting trip-changing time to 15 to 20 seconds. A second factor in reducing changing time is tracking of the two inside headings on panel entries and the establishment of crossovers immediately outby each ramp location.

TRIPS CHANGED QUICKLY

From the crossover delivery point, the ramp locomotive . . . picks up 3 or 4 cars and pulls through the crossover past the ramp on a tail track; then drops back the cars one by one until the trip is filled. The trip is then trammed straight out until it clears the crossover and is left on this loaded track while the locomotive picks up a new trip through the crossover. This process is completed in 15 to 20 seconds with the help of automatic coupling.

This excellent service is representative of the haulage efficiency to be obtained when O-B Automatic Couplers are used. O-B men can show you how to make similar time gains in your operation!

Ohio Brass
MANSFIELD  OHIO, U. S. A.
CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

O-B FORM-H

The best Trolley Tap Yet!

Speedier installation, exceptionally high cable-holding strength, increased safety, and wider utility are four good reasons for using new O-B Form-H Fused Trolley Taps in your face power supply system. Each one represents a design improvement that will bring increased productivity into your operating procedure. Here's what they mean to you.

A **SPEEDY INSTALLATION AND HIGH STRENGTH.** Two new cable terminal styles are provided. Either offers a strong, easy way of fastening trailing cable to the fuse. One uses two set screws to press the cable firmly in place against the sides of a hole in which the cable end is placed. The other uses cam-developed pressure to hold the cable, also in a hole. These are the strongest cable-gripping terminals available for use in fused trolley taps.

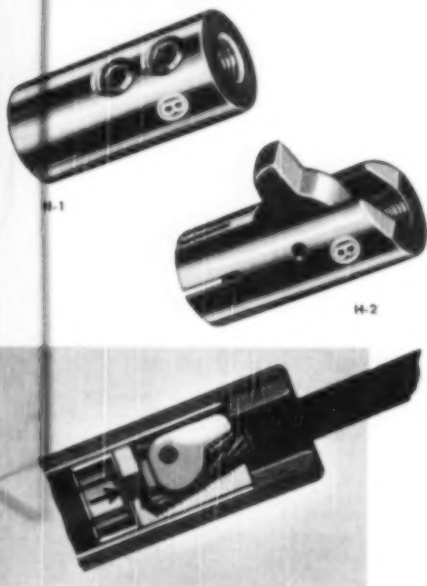
B **INCREASED SAFETY.** A rubber hand guard prevents the possibility of dust and mud entering the clearance gap at the top of the fuse case, and thus minimizes a potential shock hazard. The rubber guard cannot be chipped or cracked. It is a constant protection between the hand and the trolley wire or the contact.

C **WIDER UTILITY.** Any one of six contacts can be used. All screw into the upper terminal of the Form-H Fused Trolley Tap. Each one meets a specific power tapping requirement. Some are used for temporary connections at room entries. Others, such as the Clamp and Glider-Type or the Plier-Type, make a firmer contact with the trolley wire for semi-permanent use.

The fuse holders in top and bottom terminals are made to accommodate either the regular ferrule style fuses or the new Bussmann type BRW fuses with studs. Thus you have a wider choice of fuses for the various power demands in mechanized mining.

BETTER STILL, these changes have been brought about without sacrificing any of the superior qualities of the now familiar O-B Form-G Fused Trolley Tap. Integral asbestos lining, current carrying parts of hard drawn copper, threaded brass inserts which take mechanical load, and phenolic canvas cases are still essential features of the new Form-H Fused Trolley Tap.

Your O-B representative will be glad to show you the complete O-B Form-H line. Ask him to explain the merits of this up-to-the-minute Fused Trolley Tap.



These new terminals provide the two easiest, strongest methods ever used for fastening trailing cable in a fused trolley tap. The H-1 uses two set screws for clamping. With these two screws, it is possible to adjust the clamping force on the cable so that it will pull out at any desired load, or to hold the cable so firmly that it will break before pulling out. The H-2 has a clamping cam. A cross section shows the cam gripping the cable end. A few blows on the cam will clamp it against the wire tightly. Both H-1 and H-2 terminals have a hole tapped in the fuse holder to receive Bussmann BRW fuses with studs as well as regular ferrule style fuses. An arrow on the sketch shows this tapped hole.



The Spring Type Contact shown on the Form-H Fused Trolley Tap can be exchanged for any of these other versatile contacts. Solve your power tapping problems with this assortment.

HAULAGE WAYS Jr.



Ohio Brass

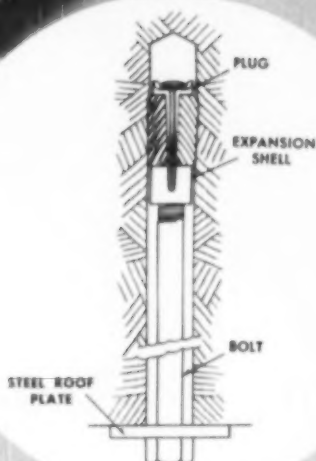
MANSFIELD



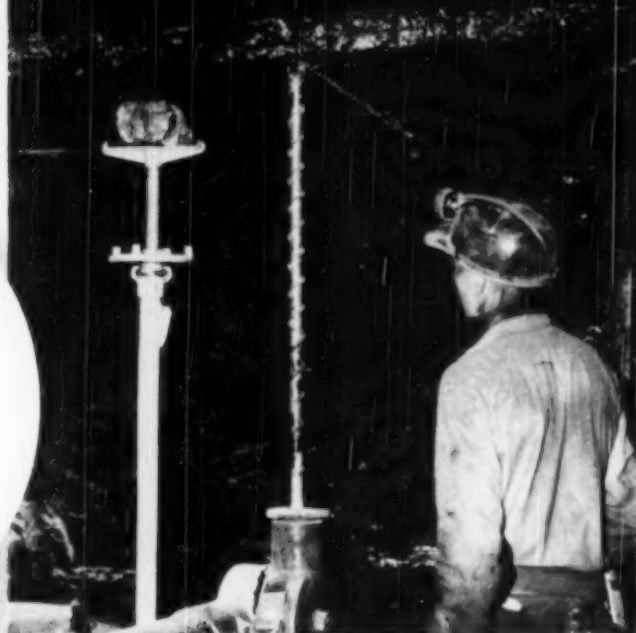
OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD. NIAGARA FALLS, ONT.

HAULAGE WAYS Jr.



As shown in the sketch, the bolt is in position ready to be tightened. The hole is deeper than bolt length, for the bolt, shell and plug assembly does not have to bear on the top of the hole.



O·B *shells and plugs*

speed your roof bolt drilling

Reductions in drilling time let you put up 90, 100 or even more roof bolts per shift when you use O-B Roof Support Expansion Shells and Plugs. Drilling can be one of the biggest time consumers in the bolting cycle, but O-B Shells and Plugs let you reduce this time

to the absolute minimum. They do it in two ways:

First, they eliminate the need for drilling to a specific maximum depth. Bolts with O-B Shells and Plugs do not have to bear on the hole top, so no time is lost checking hole depth; slow, cautious drilling is not needed to keep within allowable depths.

Second, there's no need to lose time by abandoning a hole that is deeper than bolt length. O-B Shells and Plugs bear on the side of the hole, and the holes are drilled past bolt length purposely to make sure that there will be room for the bolt to move into as it is tightened. A hole can't be made too deep!

There are other advantages, also. Your O-B representative is ready to tell you how to apply them in your mine.

Keep abreast of bolting techniques by reading informative literature based on our field and laboratory studies of roof bolting methods. Use this coupon.

OHIO BRASS COMPANY
Mansfield 1,
Ohio

Gentlemen:

Please send me the latest information on roof bolting.

NAME _____

TITLE _____

COMPANY _____

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ANGLE BAR that prevents tie slippage and consequent derailments at the Willow Grove mine of the Hanna Coal Co. is pointed out by its developer, Ernest Jasper.

Mine-Developed Angle Bar Prevents Derailments

DERAILMENTS and consequent loss of loading time, resulting from slippage of ties at switch points, have been eliminated by an angle bar developed by Ernest Jasper, section foreman, Willow Grove mine, Hanna Coal Co., Neffs, Ohio.

All the secondary track at this operation is 40-lb rail, laid on armored clip ties or plain-steel clip ties, and switches are pre-fabricated. Because of the slick bottom, considerable trouble had been experienced in keeping the No. 3 tie under the heel of the switch point and the closure rail. This resulted in numerous derailments and considerable lost loading time.

This tie had to be watched closely, and it cost considerable money to knock the tie under the switch point and closure rail joint. In the past, a plain 40-lb strap had been used as a connector for the flexible joint where the switch points connect to the closure rail.

Mr. Jasper's answer to this problem was to take a regulation four-hole 40-lb angle bar, cut it in two in the center and then cut a 2 1/4-in notch in the base of the two pieces of the angle bar. As the holes in the angle

bars are on 5-in centers, the 2 1/4-in notch in the base of the angle bar is offset. After making the first cut in the base of the angle bar 1 in from the center of the inby hole in the angle bar, he measured out 2 1/4 in, made the second cut, then cut out the center. The notch sets down over the lug in the No. 3 tie and prevents it from slipping. The angle bar also will act as a connector at the flexible joint of the switch point and closure rail.

"Necessity is indeed the mother of invention," writes one of the top officials of the company in commenting on this device. "We have found that where there is a need for a certain item one of our men will come up with the answer, whether it is something new or an improvement on something we already have in use."

Mr. Jasper attempted to secure a patent on this idea but found that back in 1892 a railroader had taken out a similar patent, although it was intended for a different purpose. "Mr. Jasper is to be commended for recognizing the need and doing something about it. At last, after 58 yr, someone will receive some benefit from this idea," the official points out.

Scale-House Signal Marks Unweighed Cars

WEIGHMASTER AND CAR DROPPER both know immediately if a loaded car passes over the scales too fast for its weight to be recorded at the scale-house of the Enos Coal Mining Co., Oakland City, Ind. If the car stays on the

scales for less than 4 sec—the time required to weigh it on the Fairbanks-Morse scales and record the weight on the Streeter-Amet recorder—a bell that signals the start of weighing continues to ring after the car has passed the lower end of the scales. Thus, if the bell keeps ringing, the car dropper and the weighmaster know that the car has passed too fast and must be switched to a siding and returned for weighing. The bell, of course, is a secondary warning to the weighmaster, who is warned first by failure of the recorder to register a weight on the tape.



WARNING BELL ATTACHED TO WEIGHT RECORDER in scale house tells car rider when a car passed too fast to be weighed.



Your Good Ideas Wanted!

YOU KNOW FROM YOUR OWN EXPERIENCE that good ideas pay off in time saved, greater efficiency and higher output. That's why you, as well as thousands of other mining men, regularly check this section for ideas you can use or adapt at your own operation. Why not help others by letting COAL AGE tell them about the operating, electrical, maintenance or safety ideas you have successfully put to work. COAL AGE will gladly pay you \$5 or more, for each acceptable one, on publication. Address: The Editor, COAL AGE, 330 W. 42nd St., New York 18.

The Foremen's Forum



"How I Converted an Unsafe Worker—"

Patience, Persuasion and Personal Interest Helped Convert Probable Accident Victims Into Safe Workers—Five Foremen of Eastern Gas & Fuel Associates Tell How They Effectively Used the Personal Approach

Persuade an Unsafe Worker To Speak on Safety



JESS ANDERSON, Carswell mine.

"Joe" was a loader on the section when I first took it over. I could tell from the first that I had a problem in Joe. He was an old miner with about 30 yr experience, who knew all the answers but was the most careless man on the section. Most every time I went around he was just getting ready to set a post, or would see me coming and be setting it when I got in the place. I tried talking to him, but he always had an excuse and thought he was getting by with something.

I was new on the section, wanted to make good, and didn't want to start by getting "hard-boiled" with Joe. So I decided to watch him closely and try to think of some solution or have him transferred to another section. Maybe his next boss, with more experience than me, could get him to work safely.

But when Monday came I had an idea I was going to try out. At our section safety meeting, which is held every Monday regardless of what time we get on the section, I asked Joe to

tell us some of his experiences and the advantage of working safely. He didn't want to at first, but some of the other men took it up and he couldn't very well refuse. He gave a good talk on safety, being interrupted every so often by someone saying, "Ain't dat so," "You sho' is right," or "Joe knows what he is talking about."

When I went into his place that night I told him that he had done a lot of good for the men, and that he must do it again some time. He often does—and you guessed it—he always sets his timbers now when needed.

Use a Familiar Illustration To Make a Point



M. H. DINSMORE, Kopperston No. 1.

Working a "rockhole" recently, I had a machineman who was an excellent workman in regard to everything but safety. One of his unsafe habits was to pull across the coal face without "sprag" timbers set into the overhanging brows. I warned him repeatedly of the hazard in this but each time it was the same thing

—a promise to be careful and continuance of the unsafe act.

At one of the weekly safety meetings I tried a new plan. I asked, "Jay, that car of yours is about shot, isn't it?"

"Heck, no," he answered, "It will outrun anything in this hollow."

"Then how come I passed you the other day doing about 30 mph on that straight stretch?" "I had my wife in the car," he said quickly. "Some time when I'm alone I'll do figure-8's around you."

"What," I asked, "has your wife got to do with your speed?"

"Oh, I've got to be careful when the Little Woman's along. I wouldn't want to hurt her in a wreck," he said.

"That's just what I thought," I said. "Outside in a car you drive carefully so you won't hurt your wife, but you come in here and take every chance in the book under these brows. Jay, I want you to think about this. Which do you suppose would hurt your wife more—to get shaken up in a collision or to attend your funeral? Remember when you married, the preacher pronounced both of you one person, so keep in mind that your wife, or anyone dear to you, is beside you at all times. The next time you are tempted to take the machine under a brow, ask your wife if it's worth the chance for the minute you are going to save."

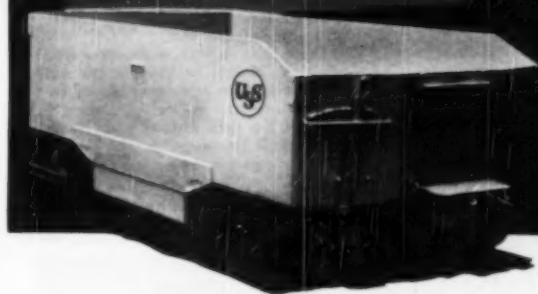
Nothing phenomenal about the talk, the illustration or the method, but it served its purpose. Jay showed a marked improvement in his safety habits and told me some weeks later, "I've noticed that we get as much coal when we stop to sprag a brow as we did by taking a chance and 'dogging' under one. Looks to me like that time used would show up on the tonnage."

"There isn't any lost time on that," I told him. "The time you use to

THE FIVE SUPERVISORS contributing to this Foremen's Forum are winners of a company contest conducted by Eastern Gas & Fuel Associates. For these contest-winning letters, they were awarded a trip to the Mine Inspectors' Institute meeting, Huntington, W. Va.

If you're in the dark ... about modern mine car construction

*Here are some
illuminating facts
about U-S-S COR-TEN*



If you want cars that withstand rough treatment, use Cor-Ten steel.

U-S-S Cor-Ten has a yield point of 50,000 lbs. per sq. in., 1½ times that of plain or copper steel. It has greater resistance to shock, abrasion and wear. It has 60% greater resistance to fatigue. That's why Cor-Ten cars can absorb abuse that would put cars of other construction right out of service.

If you want large capacity cars that will last, use Cor-Ten steel.

U-S-S Cor-Ten permits the greatest increase in size with the least increase in weight.

If you want cars with high resistance to corrosion, use Cor-Ten steel.

U-S-S Cor-Ten has 4 to 6 times greater resistance to atmospheric corrosion than plain carbon steel. Always important, this advantage is especially vital when cars operate under adverse conditions.

If you want cars that are lighter in weight, use Cor-Ten steel.

U-S-S Cor-Ten can be used in reduced thicknesses to give you lightweight construction. Yet, because of its superior physical properties, Cor-Ten properly used in reduced thicknesses will be just as strong as the heavy plain carbon steel construction it replaces.

If you want cars that pay dividends, use Cor-Ten steel.

U-S-S Cor-Ten cars require less maintenance. Out-of-service time for major repairs is greatly reduced because of Cor-Ten's proved ability to stand up under severe conditions. Of the 25,776 Cor-Ten cars now in use, 55% have been built on repeat orders—after the original Cor-Ten cars proved in service how much better they would perform. They are operated by 63 of the country's large coal mining companies.

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UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST • UNITED STATES STEEL EXPORT COMPANY, NEW YORK



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UNITED STATES STEEL

EG&FA Foremen Tell: "How I Converted an Unsafe Worker . . ."

sprag the brow is regained in cutting. It generally lets enough of the brow fall behind the machine when you cut over to it that you can keep the machine going instead of stopping to clean it up."

"There might be something to this safety, after all," he said. "I know I feel better when not taking chances, and," he added, "you will have to take my word about how fast that car of mine is. I've stopped taking chances on that, too, even when my wife is home!"

Know Your Unsafe Worker —At Work and at Home



A. W. RICHARDSON, Eccles No. 5.

When I think of safety and human failure an old buddy of mine comes back to mind. "Sam" broke all rules. Few men wanted anything to do with him as a mine buddy. Everyone shunned him as he was an accident in himself, even though he was an "every-day" man—when not in the hospital.

I was operating a cutting machine on a Joy section in 3-ft coal, which meant speed and "be there every day." My buddy was a three-day-a-week man. One day I was asking my foreman for a buddy that was a steady workman and made the sad mistake of saying that I would rather have Sam than the buddy I had. Well, I got Sam as a buddy, to my sorrow.

He had never worked on a cutting machine so my troubles began. He couldn't hook a jack, didn't know reverse bar from controller handle, and on several occasions hit me with jacks by not looking before he threw one. On one occasion he was sitting on the cutter-bar taking dust out of his shoe just as I was throwing the bit clutch in. Another time he put his shovel into the bits to see what would happen.

Well, that got the best of me and I started to work on him, rough at first, and when that failed I started finding out about Sam's private life. It was no wonder he was careless. His wife drew his pay and his son and daughter spent it and gave him a rough road to travel.

It didn't take long to see that he needed sympathy. I started by brag-

ging to the other men what a good man Sam was, how he was fast learning to be a good machineman and even got him elected as safety committeeman. It wasn't long until the hide started to grow back and the bruises began to leave his body.

Just the other day I was talking to Sam's foreman and he tells me that Sam is one of his best and safest workers. I worked Sam into a safe man and I also thank him, for while I was working on him I also made a safer worker out of myself. Thanks Sam, and keep it up, as I understand you have a 5-yr record of no accidents.

Did I say it was to my sorrow that I got Sam as a buddy? Looking back today I can see that it was my luckiest day and my greatest accomplishment.

Dramatize a "Close Shave" To Impress a Man



CHARLES JOHNSON, Powellton No. 2.

My story goes back to the late '30's. I was a motorman, and my buddy, "Shorty," knew all the answers, at least he thought so. Shorty was put with me because no other motorman would work with him. He was too careless, and it was up to me to make or break him. On our first day together I could see his mistakes—and there were plenty. The next day we had a friendly chat on safety. He still knew all the answers, but not to the questions I was asking him.

Shorty hopped on the front of moving trips, couple cars without a hook, wore loose clothing and unsafe shoes and was game for anything hazardous. When I talked to him about these hazards it seemed to go in one ear and out the other. I often told him, "Stop and think before you do such things. Who would suffer if you get hurt or killed?" He was married and had three small children, but I still hadn't made any progress. His answer would always be, "We can't get any coal if we stick to the safety rules." I would say, "You're wrong Shorty, we would get more."

I never mentioned his mistakes to the foreman because he was my problem, and I wanted to make him, not break him.

We had been together about two weeks and I had to watch every move he made. One morning I saw Shorty jump and fall at the front end of a moving trip. I stopped almost instantly, and when I got to him his trouser leg was caught by a wheel of the empty car. He was folded up in the middle of the track and the cars would have run over him. I freed his clothing from the wheel, helped him to the clearance side and asked him if he was hurt.

"No—thanks to you," he said. But he was really scared. I got the foreman to get me another brakeman for the rest of the shift. I told "Shorty" to take it easy and while taking it easy to think over what I had been telling him about safety, and what could have happened to him.

The next day Shorty came back to work, but it wasn't the hazardous fellow I worked with the day before. He was a new man—both in appearance and safety.

From that day on, while we worked together, he did everything the safe way, and often remarked about how much more coal we were hauling by doing it the safe way. Today Shorty is thankful for someone who had the patience to make him a safe worker.

Watch for Opportunities To Pass On Safety Tips



GEORGE LOMAS, Federal No. 1.

"Jim" was a timberman. He had a bad habit of walking up to the working face and setting his tools down beyond the last crossbar before testing the roof or setting safety posts. He was instructed to always keep his tools back from the face until safety posts were set and the place had been made safe.

One day, as he entered No. 2 pillar, he heard the place working. Luckily, he had not gone beyond the last crossbar because about two buggies of slate came down and he was in the clear. I explained to "Jim" what could have happened to him if he had continued to do what he had been doing in the last face before setting safety posts.

Now Jim is a safe timberman. He sets safety posts before anything else is done and makes sure the place is safe before he enters it.

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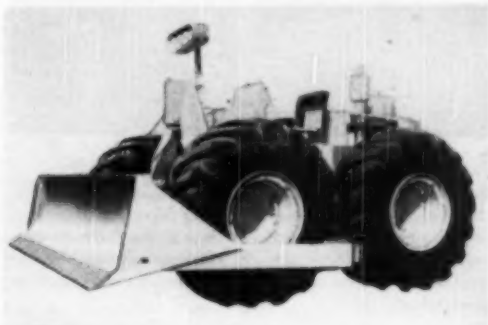
Gage Checks Roof-Hole Diameters (2)

New O-B hole-diameter gage provides a simple accurate method of keeping roof-bolt hole diameters within allowable limits. In operation, the three steel balls on the upper end of the gage are forced outward against the sides of the hole, while the lower end of the rod is calibrated in 1/16-in increments ranging from 14/16 to 1 10/16 in. Readings can easily be estimated to the nearest 1/32, it is said. Readings are taken at the depth at which the expansion shell and plug will be expanded and the calibrated scale indicates the hole-diameter tolerances for O-B shells and plugs. The gages are made in various lengths, with calibrated extensions 1, 2 and 3 ft long available to increase their lengths as needed.—Ohio Brass Co., Mansfield, Ohio.



Dump Body Hauls 45 Tons of Coal (1)

Said by the manufacturer to be the world's largest dump truck, this new Heil unit has been put in operation to haul up to 45 tons of coal and overburden at a Pennsylvania strip mine. The 28-cu yd body has a full cab protector and is activated by a Heil 2040 double-acting single-link twin-arm hoist said to be capable of raising and dumping a full load in 20 sec. The Heil Body is mounted on a specially built six-wheeled Sterling chassis with 163-in wheelbase, 325-hp diesel engine and chain drive. Road speed on overdrive is 32 mph.—Heil Co., Milwaukee 1.



Tractor-Dozer Built on Small Scale (3)

Designed to meet the need for a speedy rubber-tired four-wheeled tractor dozer to handle a wide range of jobs that do not demand a larger unit, the new small-sized Super D Tournadozer is powered by 122-hp diesel engine, has four speeds forward up to 19 mph, two reverse speeds, and features a 1.8-yd bowl capacity. Like the larger-model Super C Tournadozer, which is 3,500 lb heavier the Super D is mounted on big rubber tires available in two sizes, 21x25 or 56-in-wide base rim, that permits operation in soft going at reduced air pressures. Various attachments are available for the unit.—R. G. LeTourneau, Inc., Peoria, Ill.

Penn Valley Mining Co., Hunkers, Penna.

Gets Better Bit Performance

These Savings



\$200 per month
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A total of 6 cents
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Says John Fordyce, Superintendent



John W. Fordyce follows the policy "better methods and materials make for higher and less costly production." One of the things he did to carry out the policy at Penn Valley Mining Co. was to equip all mining machines with Kennametal. He says, "We cut three

more pieces per machine shift, and save about 20% on man-hours at the face."

A reduction from 10,000 bits to 50 bits per 5,000 tons of production has meant lower bit cost per ton. Bit grinding as a full time duty has been eliminated. All totaled, an estimated 6 cents per ton has been saved.

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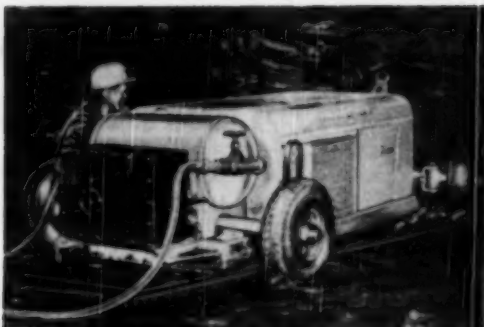
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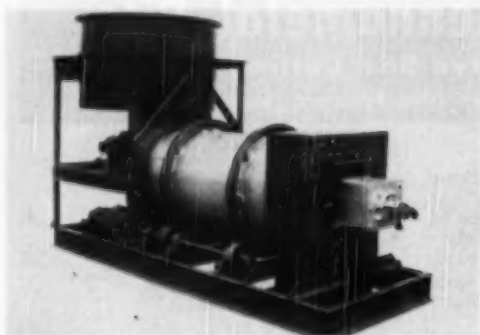
Truck Line Offers Many Improvements (4)

New Mack line of "Golden Anniversary" Model A trucks offers three completely Mack-built models said to include many new and improved design features providing increased driver comfort, improved over-all performance and lower-cost operation. The units are equipped with a new Magnadyne engine that is completely tested in the factory and requires no breaking-in on the job. The models announced are: A-20 (17,000 lb gvwt), designed for medium capacity short hauls and delivery work; A-30 (21,000 lb gvwt), for medium heavy-duty hauling; and A-40, ranging in size from 24,000 to 40,000 lb gvwt, for heavy-duty hauls, in a dumper, six-wheel and highway chassis and tractor.—Mack Trucks, Inc., New York 1.



Low Height Mine Air Compressor (5)

New Davey line of mine air compressors featuring over-all heights of 32 to 37 in to facilitate roof-bolting drilling are available in four standard two-stage sizes to deliver 105, 160, 210 and 315 cfm at 100-lb pressure. All four models are made in either self-propelled or towable units and are equipped with pneumatic tires and automotive steering, with flanged steel wheels optional. All compressor working parts are totally enclosed in a metal housing equipped with side-panel air filters. Permissible-type electrical equipment is explosion-proof (with static-free V-belts) for use in gaseous workings in accordance with USBM standards, the company says.—Davey Compressor Co., Kent, Ohio.



Sand Dryer Utilizes Direct Heat (6)

Delivering 2 to 3 tons of dry sand per hour, the Viloco oil- or gas-fired rotary sand dryer is said to utilize direct contact with hot gases to obtain maximum thermal efficiency and provide faster and more efficient delivery of dry sand. Sand emerging from the rotary drum after drying is screened, the fine sand discharging through a large outlet and the oversize material passing over the screen to a separate outlet. The unit is equipped with a friction drive mounted on sealed roller bearings.—Viloco Railway Equipment Co., Chicago 4.



Tractor-Loader Digs at Either End (7)

New-Type "Strait-Line" hydraulic tractor-loader features ability to dig at either the front or rear end, dump-



ing always in the front, to permit any type of loading without turning the unit. Said to combine features of an

overhead and conventional front-end loader, the unit is made exclusively for use on the Oliver Model 77 wheel tractor. It can lift 4,100 lb 8 ft high in front and can swing 2,900 lb over the top from the rear to front, it is said. The 9/16-yd bucket can be enlarged to 3/4 yd with sideboards and the unit can be driven between jobs at speeds up to 15 mph.—Oliver Corp., Cleveland 17.

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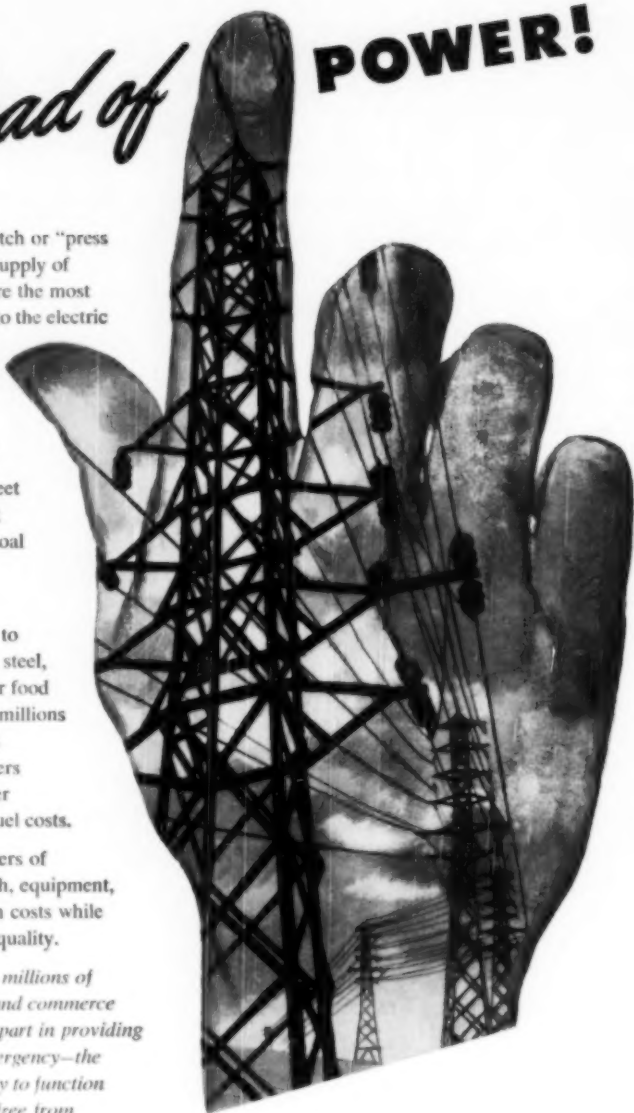
Every time you flip a switch or "press a button," you command a tremendous supply of dependable power. In fact, Americans are the most fortunate people on earth when it comes to the electric power that lights and runs their homes and factories. They have more of it, supplied at lower costs, than anyone else on earth. *And the giant share of all this power is generated by COAL!*

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Coals of tested quality are supplied also to scores of other big customers—railroads, steel, paper, cement, chemicals, meat and other food packers—and the coal dealers who serve millions of homes and stores. The coal industry is vigorously at work to provide its customers with an ever better product for ever better utilization and thus a reduction of their fuel costs.

To do this big job efficiently, the producers of coal continue to invest heavily in research, equipment, and methods aimed to reduce production costs while delivering better prepared coals of good quality.

● *To continue most effectively to serve millions of America's homes, as well as its industry and commerce and to be ready to play its indispensable part in providing all the power needed in any national emergency—the coal industry requires only the opportunity to function at its best, in a fair competitive climate, free from governmental interference.*

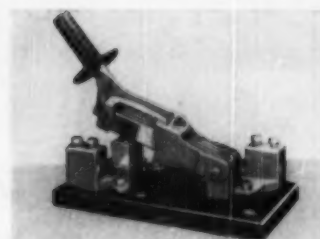


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WASHINGTON, D. C.



Heavy-Duty Feeder Switch Improved (8)

Improved line of Mesco heavy-duty feeder switches features, in addition to the conventional handle action formerly offered, a "Quick-Break" action supplied as optional equipment. Universal terminals have been added to take feeder cables from 250,000 to 1,000,000 cir mil and the redesigned cable clamp includes a pressure bar to assure full, positive contact on the cable. Six models to handle 750 to 1,500 amp, 250 to 575 v, are available, in either wood or steel boxes for mounting in any position.—*Mosebach Electric & Supply Co., Pittsburgh 3, Pa.*



Cable-Cushioning Device (9)

New M.M.P. "Cable Cushion" for use on cable-reel shuttle cars is said to eliminate cable breakage from snap take-up in operation. In installation, the tap end of the cable is permanently attached to the eye of the Cable Cushion plunger, with the solid eye of the Cable Cushion attached to the rib. Compactly built and weighing only 10 lb, the unit is strongly constructed to take considerable abuse, the manufacturer says. The operating plunger has 10 in of travel, cushioned in the initial pickup at 37½ lb and extending to 150 lb under full load. The Cable Cushion is priced at \$11.90.—*Mining Machine Parts, Inc., Cleveland 3.*

Heavy-Duty Truck Diesel (10)

Newly developed Buda Model 6-DTS-468 heavy-duty truck diesel, said to be suitable for operation in all kinds of trucks and tractors carrying gross loads up to 52,000 lb, is supercharged engine developing 152 hp, and a maximum torque of 370 lb-ft at 1,800 rpm. A 6-cylinder, full-diesel, solid-injection-type unit, the new engine features greater torque and horsepower packed into a compact,

comparatively lightweight power plant. Low fuel consumption is assured in the Buda controlled-turbulence slow-pressure combustion system, which because of more uniform pressure on the piston and moving parts results in more thorough utilization of fuel, according to the manufacturer.—*Buda Co., Harvey, Ill.*



Adjustable Time-Delay Relays (11)

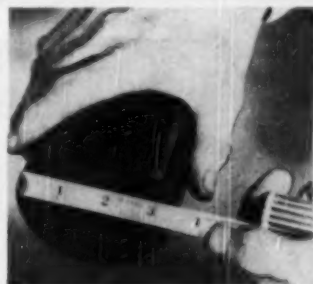
Adjustable dials now available for Haydon time-delay relays are especially useful for applications necessitating frequent change of time settings. The time can be changed easily, but once set, it is positively locked, it is said. Flexibility of designs allows for the addition of radio interference filtering and a governed motor on dc models. Clutchholding contacts for a push-button start can be supplied on either the ac or dc models. The units are available for surface, or flush-type mounting for almost every installation.—*A. W. Haydon Co., Waterbury, Conn.*



Single-Phase Motor (12)

For use where a constant-speed high-torque single-phase motor is required in large ratings, a new repulsion-induction motor added to the GE. Tri-Clad line is said to combine the high starting torque of the repulsion motor with the constant-speed characteristics of the induction motor. Designated as Type SCR, the motor is available in 5-, 7½- and 10-hp. ratings, all 1,800 rpm. The 5-hp unit operates on 115/230 v, while the other two use 230 v. Of the open dripproof type, the unit features high starting torque and low starting current with

positive operation on low voltages, making it well adapted for severe starting duty, the company says.—*General Electric Co., Schenectady 5, N. Y.*



Plastic Pipe (13)

Featuring higher burst pressure and increased resistance to suction collapse, new Carlon EX plastic pipe offers flexibility, light weight, rapid installation and absolute resistance to rot, rust and electrolytic corrosion, and is recommended for handling liquids intended for human consumption as well as for conveying industrial processing solutions, wastes, and highly corrosive gases and vapors, according to the manufacturer. It also can be used for air ducts, exhaust systems and electrical conduit and is suitable for use with suction pumps to transmit sludge and to expel acid waters from mines. A 100-ft suction of 2-in-diameter pipe weighs only 61 lb, for example, and long lengths can be curved to follow ditch, trench or ground contour, it is said. Molded plastic fittings permit plastic-to-plastic or plastic-to-metal connection. Carlon EX has burst pressures up to 260 psi and also features high impact strength.—*Carter Products Corp., Cleveland 5.*

Automatic Speed Controls (14)

A new line of automatic speed controls for the Link-Belt P.I.V. variable-speed drive are available in four basic types: electronic, hydraulic, pneumatic and mechanical. A wide choice of actuating devices and drives is said to permit an almost unlimited application of automatic control to speed-changing requirements. Link-Belt P.I.V. variable-speed drives are now available with these automatic controls in eight sizes from 1- to 25-hp capacity, with speed ratios of 6:1, and 16 standard types, including plain, motorized and single- and double-reduction-gear units for horizontal or vertical mounting. Bulletin 2349 available.—*Link-Belt Co., Chicago 1.*

Dual-Fuel Engines (15)

A new line of heavy-duty Murphy engines, power units and generator

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Duff-Norton Mine Roof Jacks . . . jack fittings . . . angle jacks and pin timbering jacks are your best choice for all mine roof supporting jobs. Their sturdy construction combines safety and dependability with economy. To specify the *right jacks* for your needs . . .

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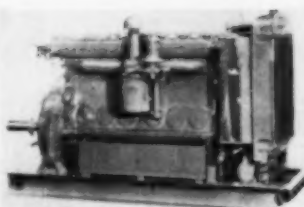


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sets capable of burning either natural gas or diesel fuel are said to permit operation on either fuel merely by proper positioning of a simple lever, with no further adjustments necessary. According to the manufacturer, the Murphy, unlike most gas engines or gas conversion engines, is a heavy-duty engine utilizing the economical advantages of high-compression combustion and offers substantially reduced fuel consumption and longer engine life. Three models now available range from 135 to 180 hp. Bulletin 107.—Murphy Diesel Co., Milwaukee 14, Wis.

Electronic Timer (16)

New compact GE electronic timer designed for automatic control of operation, limit and sequence timing features flexibility of application, accuracy and reliability in operation, low maintenance and simplicity in servicing. It is available in three time ranges: 0.06-1.2 sec, 0.6-12 sec and 6-120 sec. The new timer is said to be easily installed by means of a detachable back plate which mounts directly on a rigid conduit or any flat surface. Mechanical wear is cut to a minimum because the relay armature is the only moving part, the company reports. Bulletin GEA-5255 available.—General Electric Co., Schenectady 5, N. Y.

Diesel Generator Sets (17)

The Murphy Diesel line of diesel-electric generator sets has been expanded to 11 models ranging from 60 to 133 kw, each of which comprises heavy-duty diesel engines and generators engineered as complete integral units and permanently aligned at the factory. Features cited by the manufacturer include "true" diesel operation, a micro-control hydraulic governor which maintains desired frequency and voltage and accurate voltage control by a rapid-acting voltage regulator. The units are suited for parallel operation of two or more sets with manual or automatic switches. Loads can be equalized or switched as required, it is said. Engine and generator are mounted on a single skid or frame. Bulletin 106 available.—Murphy Diesel Co., Milwaukee 14, Wis.

Twin Respirator (18)

American Optical's new R 5055 twin-cartridge respirator, providing protection against low concentrations

Cummins Custom-built Diesels

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but Twice

The better-built engine for more profitable power

Yes, they're actually built twice. That's what makes a lightweight, high-speed Cummins Diesel such an efficient, dependable, precision-made engine. After initial assembly, each engine is run-in on the test block. Then it is torn down and carefully re-inspected—after that it is re-assembled and tested again to assure peak performance.

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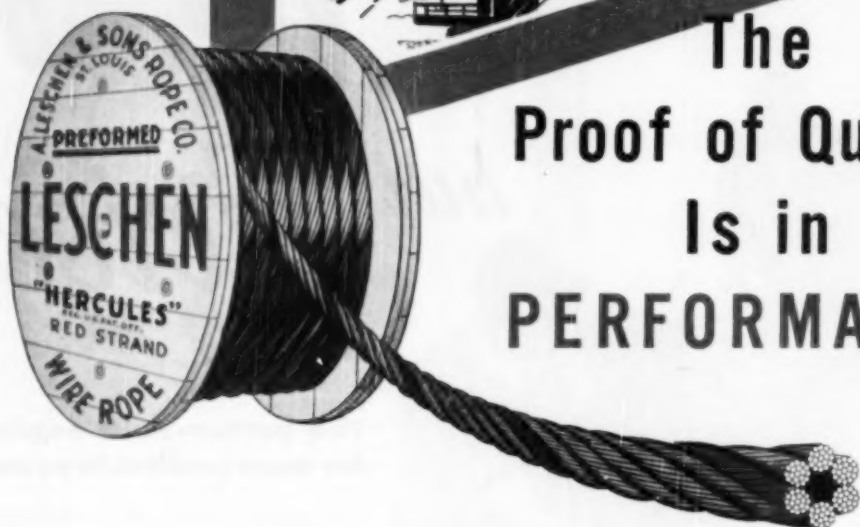
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of organic vapors and all dust (nuisance, toxic, pneumoconiosis-producing), has received USBM approval BM-2305, and is the first such respirator so approved, the company announces. No longer is it necessary for persons exposed to both types of atmospheric contaminants to change respirators, it points out. In addition, other cartridges for use with this same basic respirator facepiece protect against acid gases, combined acid and organic gases, ammonia and metal fumes.—*American Optical Co., Southbridge, Mass.*



Rubber-Tired Cranes (19)

Two new Lorain rubber-tired Moto-Cranes are each rated at 25-ton lifting capacity on outriggers at 10-ft radius, and are capable of working with 130-ft booms, it is said. Both Models MC-504 and MC-504W were developed by modifying the recently announced Lorain-50 Series turntable and mounting it on newly designed heavy-duty rubber-tired carriers. In addition to crane-boom equipment, the units may be equipped with shovel booms, clamshell, hoe or dragline.—*Thew Shovel Co., Lorain, Ohio.*

Electric Cable Hoists (20)

New line of heavy-duty Bob-Cat electric cable hoists with lifting capacities from 1/2 to 5 tons features a motor totally enclosed within the cable drum to reduce over-all dimensions, provide a substantial weight saving and fully protect the motor against weather, dust, etc. Load-sustaining parts are made from steel forgings and castings that give the Bob-Cat a factor of safety of over 6:1, it is said. Designed for operation on 220, 380, 440 or 550 v, 3-phase, 60-cycle, the Bob-Cat hoist is furnished with either pendant rope control or pushbutton control on pendant cable. Bulletin available.—*Ohio Electric Mfg. Co., Cleveland 4, Ohio.*

Cast-Iron Motors (21)

New Wagner cast-iron-frame totally enclosed fan-cooled motors are available in ratings from 5 through 250 hp, in both standard (Type EP) and explosion-proof (Type JP) de-



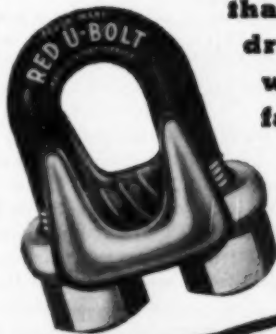
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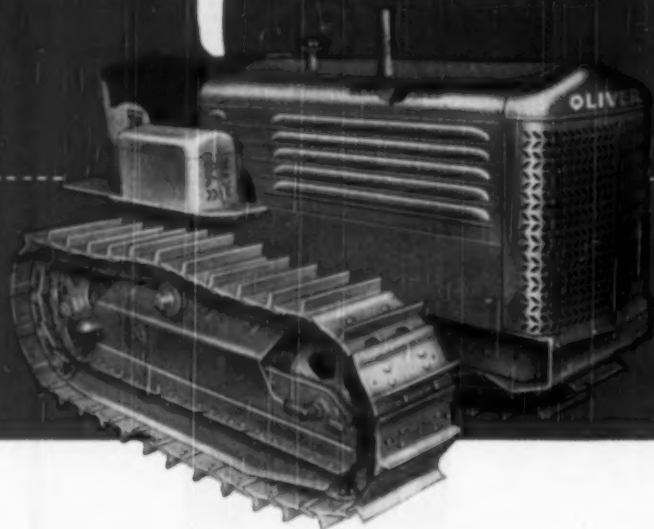
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Here's a good "steer" in tractors...the Oliver Model D Crawler and its new *air steering*.* This new finger-tip steering makes life easy for the operator...cuts down fatigue and lets him get more done per day.

Two conveniently located steering levers can be operated at the touch of a finger...assure instant, positive steering control. A compressor mounted to the front of the engine block and driven by the fan belt does all the hard work.

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For complete details, see your Oliver Industrial Distributor or write The OLIVER Corporation, Industrial Division, Cleveland, Ohio.

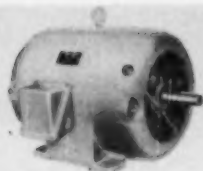
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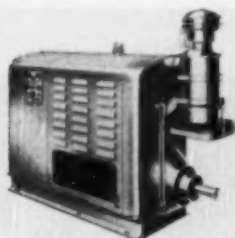
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signs. Especially suited for applications where corrosion is a problem, the units have cast-iron frames, end-plates, blower shields, conduit boxes and corrosion-resistant blowers, as well as many other specially designed features providing long trouble-free service.—Wagner Electric Corp., St. Louis 14.



Diesel Engine (22)

New compact lightweight Detroit Diesel engine is said to offer the economy and efficiency of diesel power for various applications where previous size and weight prevented diesel use. Developed for large earth-moving vehicles and general industrial equipment, the new "110" engine is a 6-cylinder 2-cycle unit rated at 275 hp, with a 110-cu in displacement per cylinder. It is offered as a bare engine, with full equipment or with special accessory arrangement for various applications. The GM torque converter, specially built for the engine, is available as optional equipment.—Detroit Diesel Engine Div., General Motors Corp., Detroit 28.

Mill Motors Improved (23)

New Crocker-Wheeler 600 Series mill motors are said to offer more power without increase in frame size, greater resistance to punishing overloads, improved commutation and lowered maintenance cost, in addition to conforming with new AISE standards. The units are available in a variety of sizes, in open, protected self-ventilated and totally enclosed types.—Crocker-Wheeler Div., Elliott Co., Jeanette, Pa.

Equipment Shorts

(24) WELDER GOGGLE—New head-set goggle features a simple mechanism by which a twist of a knob adjusts the goggle to the wearer's head size. Designed to be worn over the eyes or

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ANY TWO HEADS WILL COUPLE, and all heads are always ready to couple. In American design, couplers cannot be locked, either in open position or in closed position, unless two heads are tight together. And, as heads are uncoupled, the locks instantly position themselves for automatic recoupling.

American Couplers have extra-wide gathering range; won't "jackknife"; unlock from either side without stepping between cars; permit rotary-dumping without uncoupling. They're the couplers that stand up on tough jobs!



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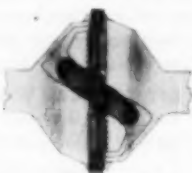
SEE HOW THEY LOCK!



OPEN



LOCKING



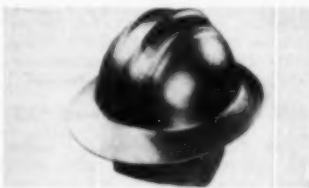
LOCKED



personal glasses, the goggles have well-ventilated indirect side shields and may be obtained with either Noviweld or Noviweld-Didymium lenses in several shades. Bulletin 5895 available.—American Optical Co., Southbridge, Mass.



(25) STORAGE COUNTER—Designed to increase the available storage space under counters, new F-G-M Rotabin counter provides aisle access to 72 large compartments in 12 28-inch-diameter independently rotating trays, plus four stationary spaces for large items. The counter is built entirely of steel and measures 6 ft 3 1/4 in by 27 in by 41 1/2 in.—Frick-Gallagher Mfg. Co., Philadelphia 2.



(26) ALUMINUM-ALLOY HARD HAT features a ribbed design for high impact resistance, plus an inner-hat assembly that is designed to absorb shock with a full-floating six-point suspension hammock. Headbands and hammocks are fully adjustable to fit all head shapes and sizes, and the natural aluminum colored crown has a non-glare finish. Bulletin available.—E. D. Bullard Co., San Francisco 3.

(27) AC-DC ELECTRODE COATINGS—New ac-dc coatings for Stoodite, Tube Borium and Borod electrodes, previously limited to dc application only, feature graphite-type base which eliminates slag interference

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and products are exceptionally stable
are, according to the manufacturer—
Steady Co., Whittier, Calif.

(38) RECTIFIER TUBE—A new
grid-controlled inert-gas rectifier, the
Westinghouse Type WL-576 di-
atron, is a three-electrode, tempera-
ture-free tube designed for industrial
control and ignitor firing service.
Maximum peak anode voltage, in-circuit
and forward, is 1500 v. For general
control service, maximum cathode
current is 50 amp peak, 1.5 amp aver-
age. In ignitor firing applications,
maximum is 50 amp and average 0.5
amp.—Westinghouse Lamp Division,
Piscataway, N. J.

(39) PREPARATION OF PRINTED
LISTS, directories and catalogs with
Bendington-Rand Platemaster is said
to eliminate the expense and delays
resulting from metal typesetting and
permits all copy to be set by regular
office typists at low cost. The list
may be maintained as a daily routine
operation, ready for publication at
any time.—Bendington-Rand Inc.,
New York 10.

(40) ELECTRIC CHAIN HOIST in
the improved Whiting line reads the
usually enclosed double-throw gear
drive and feature improved braking
power and brake life, a new simpli-
fied limit control switch and greater
maneuverability. Units available in 1/2-,
1-, 2- and 3-ton capacities. Bulletin
E-112.—Whiting Corp., Illinois, IL.

(41) KNEE PADS—New Shock Mon-
itor pads are said to incorporate fea-
tures developed from miners' sugges-
tions and field tests to offer extra-long
trouble-free service. The pads have
long-wearing tough rubber on the out-
side and soft sponge rubber inserts
for wearer comfort, and are held in
place with one elastic strap fastened
by a heavy snap buckle.—Industrial
Rubber Products Co., Charleston,
W. Va.

(42) WASTE-WATER TREATMENT
—Cochran-Liquid, sludge-control re-
actor utilizes the old chemical labo-
ratory principle that previously formed
precipitates added in the form of
sludge or slurry will accelerate chem-
ical reactions in creating acid waste
water to reduce stream pollution, as
well as in other water-treatment ap-
plications. Reduced operator time and

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1	4	11	16	21	26	31	36	42	47	52	57
2	7	12	17	22	27	32	37	43	48	53	58
3	8	13	18	23	28	33	38	44	49	54	59
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issue (give name and page number)

My Name

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(Send only if mailed before October 1, 1969)

rotation time are features of the
unit. Bulletin 5001 available.—Con-
crete Corp., Philadelphia 33.

(32) HYDRAULIC FLUID—New O-
15 flame-resistant industrial hydrau-
lic fluid, also said to have high in-
tercity, has been thoroughly field-
tested in hydraulically-operated min-
ing equipment, the manufacturer re-
ports. The fluid will not corrode
bearings or other metal parts, is a
non-conductor of electricity, does not
irritate the skin and requires no special
precautions in handling or use.
It is said. Technical Bulletin O-D-
601 available.—Monsanto Chemical
Co., St. Louis 8.

(33) SMALL-SIZED STORAGE BAT-
TERY—New addition to the Yardney
Silvercell line of high-efficiency, low-
volume batteries, Model A1-HR-1, is
less than 1 in in volume and well
under 1 lb in weight, and is capable
of a discharge rate of 5 amp up to 20
min, w.d. rates up to 20 amp. It is
said. Utilizing silver and zinc as the
active materials, the alkaline battery
is spillproof, substantially shockproof

and completely free from corrosive
fumes, vapors or spray, the manufac-
turer reports. Bulletin available.—
Yardney Electric Corp., New York 7.

(36) AIR-OPERATED TRANSFER
PUMP—Called the Fast-Flow—for
quick transfer of lubricants and other
fluids and semi-fluids from original
drums to other containers delivers up
to 70 gpm at an operating pressure of
150 lb. A weight of 15 lb permits one-
man operation and the unit fits all
drums with 3-in openings.—Industrial
Dixie, Gray Co. Inc., Minneapolis 13.

(34) CONCRETE PATCHING MAT-
TERIAL, known as "Masterquick," is
said to be an iron-asphalt patching
material that produces long-lived re-
pairs and permits easy, fast patching
or resurfacing of worn concrete floors.
According to the manufacturer, it
overcomes the problem of early break-
down under impact, particularly of
feather edges, considered with ordi-
nary asphalt patching materials. Bul-
letin available includes detailed ap-
plication instructions.—Master Build-
ers Co., Cleveland 3.

EQUIPMENT BULLETINS AVAILABLE

(35) INSULATED WIRE AND CA-
BLE—New catalog issued by Simplex
Wire & Cable Co., Cambridge 29,
Mass., presents a thorough descrip-
tion of the construction, features and
applications of its various wire and
cable for a wide range of mining ap-
plications. It contains detailed in-
structions on splicing and splicing
several types of commonly used cable.

(37) CRUSHERS—Features of the
McLanahan single-roll primary and
secondary Rockmaster crushers, de-
scribed in detail in a new bulletin
published by McLanahan & Stone
Corp., Hollidaysburg, Pa., include
low over-all height for use in low-
head-room areas, and ability to handle
a choke load and produce a minimum
of fines and fines. Construction fea-
tures, engineering drawings and ap-
plications are included.

(38) FLEXIBLE RUBBER PIPE—

Recommended applications and com-
parative qualities of flexible rubber
pipe as against metal pipe in many
services, exclusive of long lines, econo-
mies in costs of installation and
maintenance, and longer life are dis-
cussed in detail in Bulletin E-1
available from Hewitt Rubber Div.,
Hewitt-Robins Inc., Buffalo 8, N. Y.

(39) ELECTRICAL CONNECTORS
—Bulletin MC-248-2, available from
Mines Equipment Div., Joy Mfg. Co.,
Pittsburgh 22, Pa., illustrates and de-
scribes its standard line of molded-
neoprene-rubber electrical connectors
and associated equipment, such as
lamp sockets, distribution centers and
vulcanizers.

(40) MACHINERY AND MAINT-
ENANCE PARTS AND EQUIP-
MENT—Catalog 505, McNally-Pitts-
burg Mfg. Corp., Pittsburgh, Pa.,

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(55) DC MOTORS—Covering dc motors from $\frac{1}{4}$ to 1,000 hp, Booklet C-2001, Reliance Electric & Engineering Co., Cleveland 10, features design, construction, selection, and ordering information, together with frame dimensions for type "T" heavy-duty constant- and adjustable-speed motors.

(56) HOISTS, WINCHES AND CAR SPINNERS—Bulletin 155, Atlas Corp., Mountville, Pa., illustrates typical units in the company's line of Freely hoists, winches and car spinners, with information on their construction, design and operation, and sizes and capacities.

(57) MAGNETIC SEPARATOR—Application, operation and design of the Dings non-electric Alnico Perma-Drum magnetic separator are covered in detail in Catalog C-1150-A issued by Dings Magnetic Separator Co., Milwaukee 48, Wis. Included are selection data, capacities, dimensions and other information on the Perma-Drum, available in three sizes.

(58) GENERATOR CONTROLS—Application of Synchro-Start automatic engine-generator control panels for various types of gas, gasoline or diesel engines is outlined in Bulletin 414, available from Synchro-Start Products, Inc., Chicago 14.

(59) DC MOTORS—Bulletin F20-205, issued by the Electric Products Co., Cleveland 12, illustrates and describes the varied line of dc electric motors designed and manufactured by the

company for a wide range of applications.

(60) PNEUMATIC CONVEYING SYSTEMS—Bulletin 185, Conveair Corp., Pittsburgh, Pa., illustrates the operation and various applications of the Conveair method of conveying lumpy, granular or powdered materials in a flow of air or inert gas at low pressures. The system is said to be applicable to many materials, including coal, and two of the applications illustrated show unloading and drying of wet coal and a rock-dust distributor.

(61) HOSE COUPLINGS—Catalog section on its line of hose couplings and fittings, published by the E. F. Goodrich Co., Akron, Ohio, illustrates and details each type, together with specifications, general and maximum pressure recommendations and a description of threads.

(62) DIESEL OIL—Circular on the new D-A diesel oil available from the I-A Lubricant Co., Inc., Indianapolis, Ind., describes how and why D-A diesel oil reduces engine deposits and neutralizes destructive combustion-chamber acids.

(63) MAGNET WIRE—Detailed information on GE Fernox and Delta-boston magnet wires now is available in a new booklet published by the GE Construction Materials Dept., Bridgeport 2, Conn. It combines listing of both film type and asbestos-and glass-insulated magnet wires, and fully covers development, properties, applications, advantages and available sizes, with considerable test data specifications.

(64) SAFETY GLASSES—To simplify choosing the proper safety glasses for 59 specific jobs, Bausch & Lomb Optical Co., Rochester 2, N. Y., offers a compact easy-to-use Safety Eyewear Selector. Job-classification numbers refer the user to a sliding selection table that lists and illustrates the safety frames applicable for each of the various occupations.

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(65) REBUILDING TRACTOR PARTS with Mangalloy 11-12% manganese-nickel steel applicator bars and welding electrodes is outlined in a folder from Stude-Heiklen Co., Newark 5, N. J. Methods of application and bar sizes for various makes of tractors are included.

(66) AIR PUMPS—How air pumps operate and where they are effectively used are fully described and illustrated in Catalog 480 just issued by Leliman Bros., Inc., Newark 5, N. J. A section deals with air motors, which are air pumps operating in reverse with compressed air as the power source and transmit power to any device to be operated, providing variable-speed control and safe operation where inflammable vapors, gases, dust, etc., are present, it is said.

(67) PIPE FITTINGS—Kennedy Valve Mfg. Co., Elmira, N. Y., offers Bulletin 504, which describes its complete line of cast-iron, malleable and bronze fittings, including the recent additions of cast-iron screwed, flanged, sprinkler and extra-heavy malleable fittings.

(68) CORROSION PREVENTION—Bulletin 21, Metallizing Engineering Co., Inc., Long Island City 1, N. Y., outlines the features and many applications of the Metco Systems to provide pure zinc or aluminum coatings properly treated to withstand various corrosive conditions. They are applied directly to the steel base with standard metallizing equipment and then given a specific organic treatment depending on the service requirements.

(69) CARBURETOR CLEANER—Catalog sheet on Gumout, an easy-to-use tool for cleaning carburetor on the engine with Gumout, gives full directions for use. The complete job requires less than 20 min. according to the sheet, which is available from the Gumout Div., Pennsylvania Refining Co., Cleveland 4.

(70) SCAFFOLDING—Folder A6 on "Advance" tubular-steel scaffold, published by Beaver Art Metal Corp., Advances Scaffold Div., Ellwood City, Pa., describes the patented self-contained cam locks for instantly attaching cross braces to panels and the stack lock for locking panels together vertically and illustrates various types of standard panels.

Shoot for the PREMIUM sizes!



**Get more -- and better -- lump coal
at less cost per ton
with Red Crown Permissible**

In mine after mine, Red Crown Class A Permissible has proved its ability to produce more lump coal, less slack, and bring down a greater tonnage of coal per pound of explosive used!

Red Crown shoots with a slow, pushing action very similar to that obtained with black powder. Its low detonating speed has remarkable spread. In either firm or friable structure, Red Crown shears the ribs clean, yet does not severely shatter the coal in the vicinity of the hole. Lumps are firmer, contain fewer pin cracks---there's less degradation from mine to consumer.

CAN RED CROWN UP-GRADE YOUR PRODUCTION? We believe it can! And a trial in your mine, under actual operating conditions, is the best way to show you that Red Crown gives superior results. We will be glad to demonstrate Red Crown in your mine at your request. Just say the word to your King Powder representative or write us direct. Why not profit by arranging that demonstration date today?

6 ADVANTAGES In Every Red Crown Shot

1. Red Crown is easy on the roof.
2. Slow heaving and spreading action with results similar to those obtained with the use of black powder.
3. Power distributed evenly throughout the face of the cut.
4. Coal displaced in firm, hard lumps means less degradation.
5. Red Crown, containing no nitro-glycerine, is the non-headache permissible.
6. Less smoke and fumes means less down-time for expensive equipment.



THE KING POWDER CO. INC.
CINCINNATI 1, OHIO INCORPORATED 1878

Among the Manufacturers

Euclid Road Machinery Co., Cleveland, has named R. M. Brown a district manager covering Ohio, western Pennsylvania, Indiana, Michigan, and Kentucky. Mr. Brown, who has been with Euclid 16 yr, most recently as manager of the sales-development department, replaces V. L. Wheeler, resigned. Alan S. McClimon, formerly a special representative for the company, succeeds Mr. Brown in the sales-development department.

Harlowe Hardinge, president, Hardinge Co., Inc., York, Pa., recently returned from a 60-day, 25,000-mi business trip, 23,000 mi of which was by air, through Europe and Africa. During the trip he contacted key industrial personnel in England, France, Belgium, Germany, Belgian Congo, Northern Rhodesia and South Africa.

Douglas E. Newton has been appointed general sales manager, Denver Equipment Co., Denver, Colo. Mr. Newton joined the company in 1939, served as manager of the Western Sales division, and for the past 2 yr has been in charge of its manufacturing plant in Colorado Springs, Colo.

International Harvester Co., Chicago, has named L. J. Lange industrial power product specialist, concerned with the design and sale of industrial wheel and crawler tractors and power units. Mr. Lange, who joined the company in 1936, succeeds S. L. Siegfried.

Sprout, Waldron & Co., Inc., Muncy, Pa., has appointed Harold J. Alsted general sales manager, a newly created position said to be necessitated by the company's expanded activities in widely diversified fields. Mr. Alsted has been a sales representative for the company since 1936.

Worthington Pump & Machinery Corp., Harrison, N. J., has appointed William A. Meiter to the newly created position of central sales manager, directing the sales of the Buffalo, Detroit, Cleveland, Cincinnati and Pittsburgh offices. John W. Stovall has been appointed manager of the Buffalo district sales office, succeeding Mr. Meiter.

Southwestern Engineering Co., Los Angeles, has promoted R. V. Gunther to the position of assistant production manager and L. G. Jansow to chief engineer, manufacturing division. James F. Geary has been appointed chief engineer, construction division. Mr. Gunther has been with SWECO for 8 yr and formerly was a senior engineer. With the company since 1936, Mr. Jansow previously was design engineer.

Ward Leonard Electric Co., Mt. Vernon, N. Y., has appointed W. C. Schofield assistant sales manager. Before joining the company in 1948 to direct sales in the industrial control division, Mr. Schofield was a co-owner of the Federal Engineering Co., Washington, D. C., a manufacturers' agency specializing in electrical equipment.

Le Roi Co., Milwaukee, has appointed Ray Rodolf a special sales representative in construction and mining equipment to major contractors and mining operations. Active in the field as sales representative for many years, Mr. Rodolf joined Le Roi last March.

General Electric Co. has announced a number of new executive appointments, as follows:

John L. Busey has been elected a vice president and placed in charge of marketing policy for the company, a



Service Honors Go to LeTourneau Founder

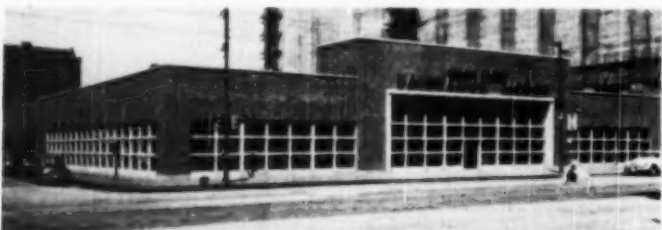
TOP HONORS for length of service with R. G. LeTourneau, Inc., Peoria, Ill., went to the founder and president as the company recently inaugurated a program of awarding service pins to employees. Mr. LeTourneau (center) is shown receiving a diamond-set 30-yr pin from Elmer Isgren (right), executive vice president, as Marie R. Yontz, vice president and treasurer, looks on. Both Messrs. Isgren and Yontz received 15-yr. pins.

newly created position. William V. O'Brien, formerly general sales manager of the Apparatus Dept., has been elected a commercial vice president and named assistant manager of marketing policy. Charles R. Pritchard, manager of marketing for the Appliance and Merchandise Dept., has been elected president and a director of the GE Supply Corp., succeeding Mr. Busey.

Francis E. Fairman has been appointed general sales manager of the large apparatus divisions, and Arthur W. Bartling general sales manager of the small apparatus divisions of the GE Apparatus Dept. Mr. Fairman is succeeded as manager of sales for the transformer and allied product divisions by William S. Ginn, formerly assistant sales manager. Mr. Bartling formerly was manager of sales for the department's fractional-horse-power motor divisions.

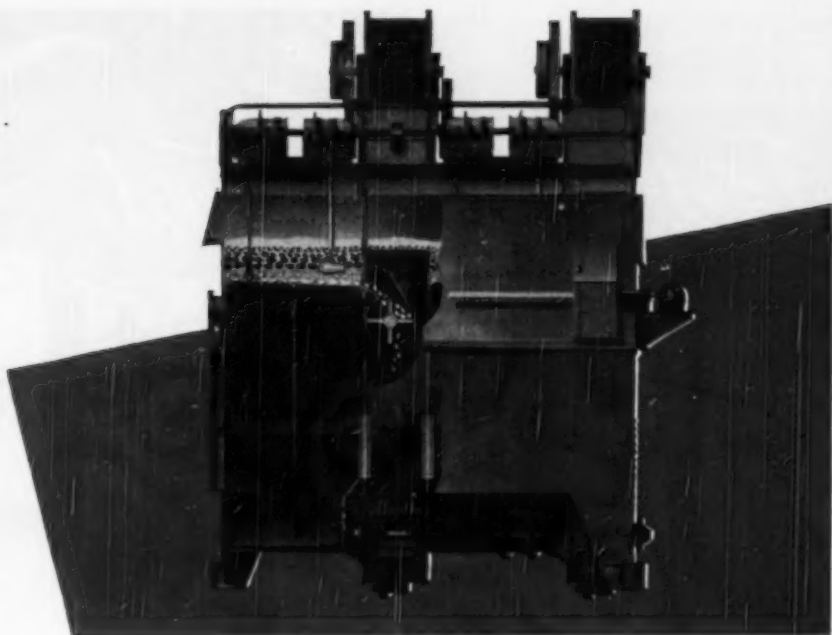
J. P. Keller, formerly superintendent of all generator and turbine-bucket manufacturing for the turbine divisions of the Apparatus Dept., has been made assistant to the manager, industrial divisions. Harrison D. Beale, previously in charge of the renewal-parts division, industrial division, has been appointed manager of that division.

A. K. Bushman, manager of the application and service engineering divisions of the Apparatus Dept., has been appointed to the newly created post of manager of industry divisions



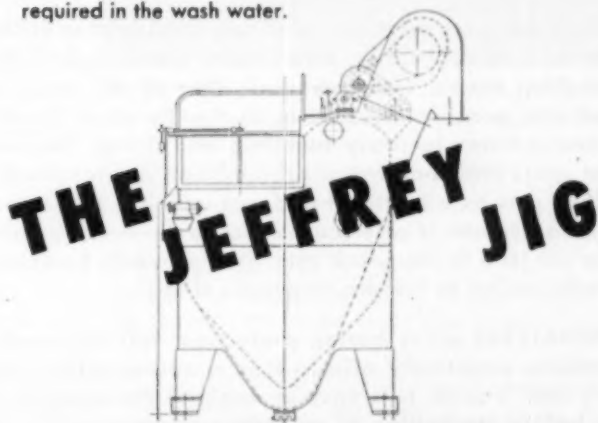
Fairbanks Morse Opens New Chicago Branch

RECENTLY COMPLETED building housing the Chicago sales and service branch of Fairbanks, Morse & Co. is the fifth such construction project completed under the company's program of providing modern new offices throughout the country. Located on the corner of South State and 16th Sts., the new structure, with the site, represents an investment of more than \$500,000. The building is of the latest modern design, automatically heated and air conditioned, and includes a modern scale shop, diesel-repair shop, warehouse and display floor, in addition to branch offices.



Jeffrey 84" Two Compartment, 4-Cell Jig with 84 square feet of Screen Area (Patented).

Minimum Maintenance Expense — No Abrasive Additives required in the wash water.



THE JEFFREY MANUFACTURING CO.

Established in 1877

912-99 North Fourth Street, Columbus 16, Ohio

SALES OFFICES:

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Better Stoker Feed



...IMPROVES THE FLOW AND PROTECTS INDUSTRIAL EQUIPMENT

Industrial users of stoker coals are finding that PERMATREAT, the oil-base coal spray, offers many advantages in firing and handling stocks. This treatment, first of all, settles the dust and dirt problem by sealing in the fly dust. Stocks remain more uniform for easy handling and firing. The dangers of hot spots and spontaneous combustion are lessened. PERMATREAT acts as a lubricant and rust inhibitor in all your handling equipment. It also causes coal to de-water faster, both in the car and in the stock pile. This prevents freezing, makes stocks easier to handle, improves firing.

PERMATREAT gives lasting protection, will not wash off and remains completely effective as a dust-proofing agent until the coal is used. It is easy to apply at the mine, in the yard or before stockpiling at unloading docks.

Ask your Supplier for



OIL-TREATED COAL

ASHLAND OIL & REFINING COMPANY

Ashland, Kentucky

in the sales organization of the department.

New appointments in the small and medium motor divisions include: D. E. Moorhead, administrative assistant to the manager; O. F. Vea, manager of sales; and F. B. Hornby, manager of engineering.

Improved service to users of GE equipment in the Rocky Mountain area is to be expected with the completion of new and expanded repair, maintenance and warehousing facilities at 301 S. Seventh West St., Salt Lake City, the company has announced. The new facilities provide 50% more warehouse space and double the former capacity for service and repair.

Electric Products Co., Cleveland, Ohio, has appointed K. I. Clisby Associates, Philadelphia, Pa., district representatives for the eastern section of Pennsylvania, the southern counties of New Jersey, most of Maryland and the state of Delaware.

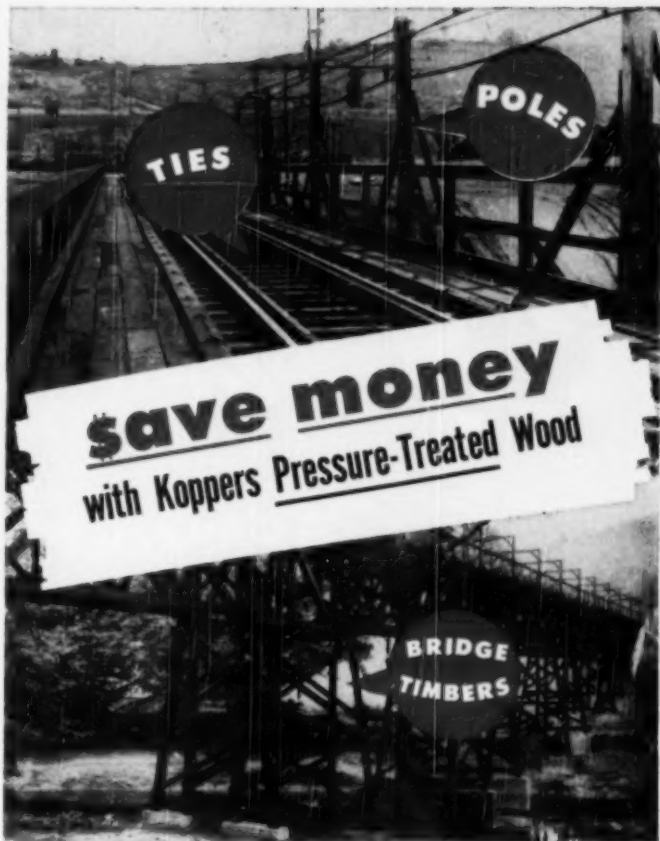
Joseph E. Bradbury has been promoted to manager of the alloy sales section of the valve and fitting department, Crane Co., Chicago.

Bemis Bros. Bag Co., St. Louis, has granted two fellowships for the study of its company organization and operation under a national program designed to encourage an exchange of information between college staff members and business. The fellowships were granted through cooperation with the Foundation for Economic Education, Inc., which established and directs the College-Business Exchange Program. Under the program, fellowships are offered to college teachers for a six-week summer period during which they make an intensive study of a business firm.

A major expansion in the facilities of The Baker Mfg. Co., involving an expenditure of more than \$150,000, has been announced by W. Converse Staley, president. Construction is to start immediately on a new brick and steel building to contain approximately 10,000 sq ft of floor space for additional assembly space. With the expansion completed last fall, totalling 26,000 sq ft, capacity of the Baker plant will be more than doubled.

Deister Machine Co., Fort Wayne, Ind., has named the Indiana Equipment Co. a distributor for Deister vibrating screens in all of Indiana except the Calumet area. Indiana Equipment maintains complete show rooms and service facilities with factory-trained mechanics in Indianapolis at 1244 W. 16th St., and in Fort Wayne at 1902 S. Harrison St.

Chicago Eye Shield Co. has appointed the Guardian Safety Equipment Co., Birmingham, distributors for the states of Alabama and Mississippi. Howard Freed, who formerly serviced industrial plants in Ohio for Williams & Co., will head the new distributorship, which also will carry a complete line of supplementary safety equipment.



These pictures show some of the places where wood takes a terrific beating . . . some of the places where it pays to use Koppers Pressure-Creosoted Wood.

Koppers Pressure-Creosoted Timber is fully protected against decay. By using this long-lasting protected wood instead of ordinary wood, many mine operators have doubled, tripled

and often quadrupled the life of ties, poles, piles, caps, bridge timbers and cribbing.

Wood that retains its strength is not only cheaper in the long run, but it's much safer to use, too. For the full story of Koppers Pressure-Treated Wood, send for our free book, "10 Proven Ways to Cut Mining Costs."

KOPPERS COMPANY, INC., Pittsburgh 19, Pa.

KOPPERS

PRESSURE-TREATED WOOD



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Dept. CA-5
Pittsburgh 19, Pa.

Please send me a free copy of "10 Proven Ways to Cut Mining Costs."

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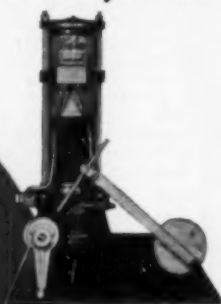
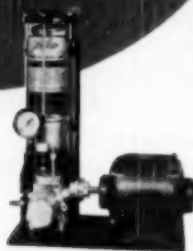


"Trabon systems operate efficiently when buried under coal dust, water, or grime!"

Trabon

Leads in

AUTOMATIC LUBRICATION



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OF BULLETIN 469.

Trabon

OIL AND GREASE SYSTEMS

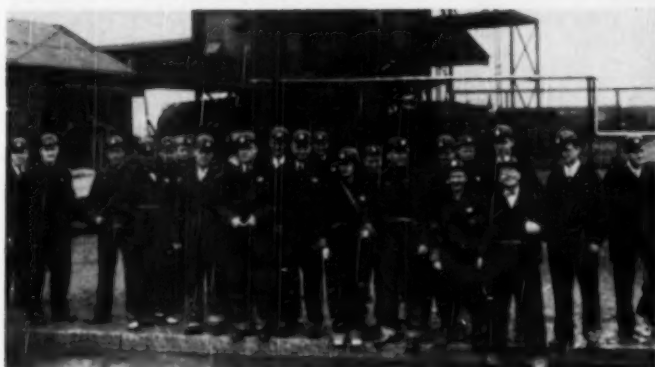
• Backed by 20 years of experience in engineering and installing lubrication equipment, Trabon assures reduced maintenance costs and better tonnage flow on your operation. Trabon oil and grease systems have ONE indicator at the pump — every bearing gets its full measured amount. Trabon systems are SEALED — no exposed parts.

There are more Trabon automatic systems in operation than all other makes. Trabon can save both time and money for YOU. Call or write today.

TRABON ENGINEERING CORPORATION
1814 East 40th Street • Cleveland 3, Ohio



News Round-up



NEWSMEN, MAGAZINE WRITERS and radio commentators at the anthracite press conference spent an hour underground at Huber Colliery, Glen Alden Coal Co.



"ANTHRACITE is not archaic or dying," R. E. Taggart tells the press.

Press Hears Anthracite's Progress Plan

Day-Long Conference With Anthracite Institute Reveals \$2,600,000 Spending Program for Advertising and Research—Journalists Tour Mine, Inspect Anthracite Laboratory and Learn Facts About the Industry

THE ANTHRACITE INDUSTRY will spend a record-breaking \$2,600,000 for advertising, promotion and research in the next 12 months. This was revealed July 11 during a one-day press conference staged at Wilkes-Barre, Pa., by Anthracite Institute.

This big expenditure, together with improved burning equipment growing from continued research and testing in the institute's laboratory, will strengthen anthracite's present markets and add new commercial and industrial customers, institute officials predicted. In addition, the industry is prepared to take over a large share of the fuels market if another war develops, spokesmen said.

Executives of Anthracite Institute and anthracite producers made their announcements as they played host to 27 journalists and radio commentators who traveled to Wilkes-Barre from metropolitan centers in the industry's major market areas and to an equal number of press and radio represen-

tatives from the anthracite-producing region.

Among those attending the conference were writers and analysts from metropolitan dailies, news syndicates, trade and industrial publications and home magazines. In addition, over 50

industrial, civic and labor leaders in the 9-county producing region were present.

In a tight-packed schedule, the visitors toured underground and surface workings of the Huber Colliery, Glen Alden Coal Co.; saw new home and commercial heating equipment being developed and tested in the institute's laboratory; inspected manufacturers' displays of home-heating units; saw experimental burners designed to make fuel and synthesis gas from silt and culm; and heard a briefing on the industry's economic significance and its plans for the future.

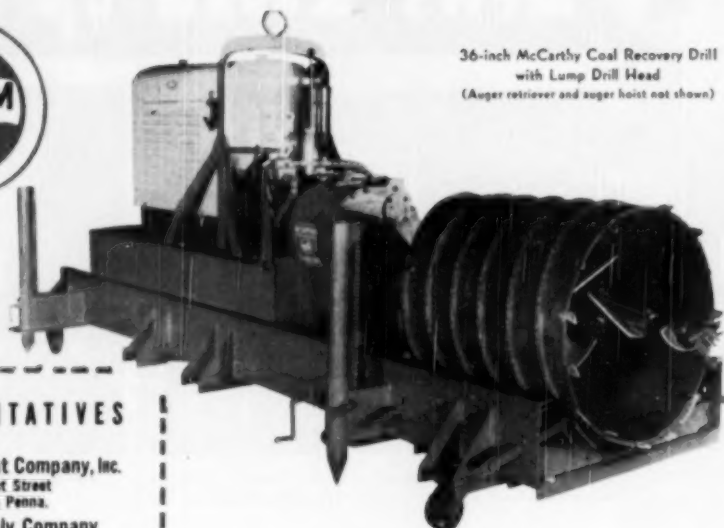
The \$2,600,000 fund announced to the press will include \$1,000,000 recently voted by the directors of Anthracite Institute for television and newspaper advertising, product promotion, dealer and consumer services, and addition of 16 men to the institute's field staff; \$600,000 for research and other institute activities; and \$1,000,000 to be spent by individual producing companies for radio time and newspaper space.

In a pre-luncheon session, institute guests heard six institute executives describe anthracite's role in the national economy, the organization and work of the institute, and the institute's projects in the fields of mine safety, research and development, public relations and producer-retailer

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12 to 50 tons per man per shift with *LOW INVESTMENT COST*



36-inch McCarthy Coal Recovery Drill
with Lump Drill Head
(Auger retriever and auger hoist not shown)

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Nixon Machinery Company
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Chattanooga, Tenn.

O. Philipp & Company
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New York 6, New York

Rish Equipment Company
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Box 353, Charleston 22, W. Va.
Clarksburg, W. Va.
Box 1369, Roanoke, Va.
Box 269, Bluefield, W. Va.

Union Supply Company
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W. W. Williams Company
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R. A. Young & Son, Inc.
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• Many successful mine operators credit McCarthy Coal Drills with tremendous new savings in time and money.

Recent reports from the Coal Salvage Company show that, with a 36-inch auger, the powerful McCarthy unit, running almost maintenance free, delivers 130 tons of coal during each 7¼-hour shift for an average daily rate of 32½ tons for each of the 4-man crew.

With a 24-inch auger and a 3-man crew, average daily output amounts to 55 tons or 18½ tons per man.

The versatile McCarthy Coal Drill has plenty of extra power for handling 12, 16, 20, 24, 30 and 36-inch diameter auger sections with a smooth, steady bore that penetrates to almost any depth.

McCarthy Coal Drills can be equipped with electric, gasoline or diesel motors for both deep mine and stripping operations.

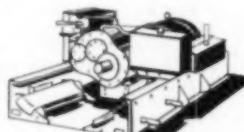
Write today for the full story on this remarkable new money-maker.



Lump Coal Recovery
Drill Head



Coal Recovery in Highwall



Underground Coal Recovery Drill

THE SALEM TOOL COMPANY

743 S. Silversmith Ave., Salem, Ohio, U.S.A.



A "New Look" in Coal and Coke Delivery

CLEAN, QUIET DELIVERY of coal or coke direct from the truck to the household bin now is possible with this attractive conveyor-unloading-type special enclosed body developed by the Koppers Co., Inc., Clifton, N. J., and mounted on a Series F-6 Ford truck. One-man operation of the unit is simplified by a push-button control on the end of an extension cord by which the driver can control the conveyor system utilizing a chute and trim conveyor leading to the bin. The truck

carries 4 tons of coke in separate v-shape compartments, from which it flows by gravity through a compartment gate to a main underbody conveyor running the entire length of the body. The unit was developed following a study by the American Coke & Coal Institute's committee on delivery, headed by Thomas Leather, manager of the Koppers Clifton district which pointed up the fact that there had been no basic improvement in solid fuel delivery in 15 yr.

cooperation. Speakers were Frank W. Earnest Jr., president, Anthracite Institute; J. D. Jillson, secretary; Norman F. Patton, chief statistician; R. Emmet Doherty, dust-control engineer; Dr. R. C. Johnson, vice president in charge of research; and J. M. Crosby, assistant to the president.

At lunch, where Mr. Earnest announced the \$2,600,000 fund, cooperation in the industry's drive for progress was pledged by R. Lloyd Jones, chairman, Eastern States Retail Solid Fuel Conference; F. T. Armstrong, vice president, Wyoming Valley Chamber of Commerce; Mart F. Brennan, president, District 7, UMWA; and R. E. Taggart, president, The Philadelphia & Reading Coal & Iron Co.

Speaking about labor relations in anthracite, Mr. Brennan cited his confidence in the individual and collective leadership of the industry and his faith in the advance of machine mining. "People should have coal when they want it and the UMWA will maintain adequate supplies as far ahead as we can see," he said. There never has been a strike against a decision of the Anthracite Board of Conciliation in its 50-yr history and labor relations in anthracite now are better than ever, he declared.

Anthracite labor relations are characterized by good manners and satisfactory wage agreements always are reached and carried out honestly and diligently, Mr. Taggart said. How-

ever, the press has not always differentiated between the labor problems of the two solid-fuel industries, he contended.

"The anthracite industry is not archaic or dying but it does deserve some thought about its problems," Mr. Taggart said. Calling for a national fuels policy, he cited the competitive threat of imported foreign oil, the need for adequate emergency capacity in the coal industry and the urgency of developing a synthetic-liquid-fuels industry.

Northern Group Unites To Improve Labor Scene

Commercial and captive producer and operator groups in the northern fields, capping a months-long search for ways to improve labor relations and contract negotiations, announced July 11 that they had formed the Bituminous Coal Operators' Association.

The new organization represents about 150,000,000 tons of annual production in central and western Pennsylvania, northern West Virginia and Ohio. The group's announcement of its organization, issued following a meeting in Pittsburgh, Pa., stated that it is not a closed association and that additional membership is expected.

"The purposes of the new associa-

tion are to promote stable and harmonious industrial relations between its members and their employees and to negotiate for its members basic agreements covering wages, hours and conditions of employment with representatives of their employees," the announcement said.

A permanent president has not yet been named, though Harry M. Moses, president, H. C. Frick Coke Co., frequently has been mentioned for the position. At the organizational meeting, the group elected a board of directors, and executive committee and temporary officers. A small committee later will select a permanent president and will assist him in securing a staff and setting up headquarters, probably in Washington, D. C.

Union-Shop Clause Void, Federal Court Rules

The United States Court of Appeals has ordered the UMWA and its president, John L. Lewis, to abandon the union-shop clause in their contract with captive mines. The ruling, handed down July 17, upheld a decision by the National Labor Relations Board in May, 1949.

Under the court's order, the union cannot compel the mine employees of 18 steel companies to join unless the employees vote for a union shop. Captive miners have not held an election on the issue because Mr. Lewis, side-stepping the Taft-Hartley Act, has refused to sign a non-Communist affidavit and submit financial reports, as required by that act, and thus has barred his union from protection of the NLRB.

UMWA spokesmen said the union would appeal the court's decision.

The union struck the captive mines 2 yr ago to compel the companies to write the clause into the contract. Though Mr. Lewis won his point, it was agreed the clause would be subject to court test.

A similar union shop clause is written into the UMWA contract with commercial operators. The final decision may affect this contract also.

Fatalities Show 6-Mo Drop

Fatalities in both anthracite and bituminous mines continued the downward trend in the first half of 1950, as compared with the same period of 1949, according to USBM figures. A total of 282 men were killed in January to June, 1950, against 340 in 1949, for fatality rates of 1.11 and 1.21 per million tons, respectively. The 1950 and 1949 deaths and fatality rates for the two industries were: anthracite: 34 and 48, 1.54 and 2.34; bituminous: 248 and 292, 1.07 and 1.12. Falls of roof and face caused 164 deaths in 1950, accounting for more than half the total fatalities and for practically three times those from haulage, the next largest cause.

News in Brief

Steel Output Hits New Peak

U. S. steel production set a new all-time high in the second quarter of 1950, with an output of 24,895,488 net tons. The output in the second quarter also helped set a new 6-mo record, with the tonnage for the first half of the year totaling 47,106,141, nearly 1,200,000 tons above the first half of 1949, the previous record. Plans by 13 steel companies to raise steel-making capacity by 6,363,000 tons, at a cost of more than \$1 billion, were reported July 19. When the 2-yr program is completed, the U. S. steel industry will have an annual capacity of 105,750,000 tons.

Lake Coal Up in June

Shipment of coal on the Great Lakes was 5,992,330 tons in June, some 400,000 tons more than in 1949 in spite of a dock workers' strike at four Lake Erie ports. While movement began later this year, the total for the season through June was 17,812,754 tons, as compared with 17,986,271 tons in 1949.

Coal Gift Aids Youth Group

A carload of coal donated by Walter Bledsoe & Co. played an important part in "Operation Auction" staged June 9-10 in Peoria, Ill., to raise funds for a new Farm and Youth Center. Coal Heating Service of Greater Peoria also participated, with 10 of its members donating their services and equipment to unload and deliver to the successful bidders. The coal was one of some 5,000 items donated by individuals and businesses.

Miners' Earnings Still High

Average hourly earnings of bituminous coal miners rose slightly from \$2.014 in March, 1950, to \$2.02 in April, according to statistics of the U. S. Department of Labor. Average weekly hours worked totaled 36.0 in April, against 39.3 in March. Average weekly wages were \$72.72 and \$79.15, respectively.

New Heater Uses Powdered Coal

A new-type heating unit which burns powdered coal has been perfected and will be ready for installation for the 1950-51 season, according to an announcement by BloKoiGas System, Inc., Detroit, a new company organized to manufacture and market the unit. To assure customers of an uninterrupted supply, the company will process the powdered coal, delivering it "clean and dust-free from a sealed truck tank, through a hose

into a sealed storage container." The first units available will be of the conversion type for commercial use, with smaller home-size burners to follow. Increased combustion efficiency may cut heating costs in half and the small volume of ashes will be removed by the delivery truck, the company says.

Socialized Coal Hit in Broadcast

A transcribed interview with Dr. C. J. Potter, president, Rochester & Pittsburgh Coal Co., on "Who Wants Socialized Coal?" was to be broadcast over 120 stations in 35 states and the District of Columbia during the week of July 16-22. In the broadcast, which is to be carried as a part of the "Americans, Speak Up!" series, Bill Slater, well-known radio personality, interviews Dr. Potter, who presents a strong answer to those proposing nationalization of the industry. Bituminous Coal Institute, which cooperated in the project, has transcriptions available for local sponsorship over other stations.

C. & O. Orders 3,000 Coal Cars

Purchase of 3,000 new coal hopper cars and 1,000 boxcars was approved by the directors of the C. & O. July 18. ACF will build 2,000 of the coal cars at its Huntington, W. Va., plant, and Bethlehem Steel will build the other 1,000 at Johnstown, Pa.

Red Jacket Starts New Mine

Preliminary work on a new fully mechanized 4,000-tpd mine recently was begun by the Red Jacket Coal Corp. To be known as Mine No. 17, the operation will have a new preparation plant with complete mechanical-cleaning facilities and will be located about 1 mi from Red Jacket, W. Va. The Cedar Grove seams will be mined and reserves are estimated at 35 yr.

Full Output for Peabody Mine

The new Mine 17 of the Peabody Coal Co., at Pana, Ill., was expected to shortly reach full production of 9,000 tpd., according to an announcement made at the company's annual meeting June 26. Closing of its Mine No. 57, at Springfield, on June 30, after continuous operation since 1886, also was reported. The 3,000-tpd output from No. 57 will be secured from the new Pana mine and a large percentage of its employees will be transferred to other properties, it was said.

N. & W. Goes to Steam

The N. & W. recently announced

that it was discontinuing electrification between Bluefield and Iaeger and on several branches, for a total trackage of 76 mi. With the elimination of these facilities, part of which had been in service since 1915, the line becomes one of the few railroads in the country which uses coal-burning steam units exclusively. Complete use of steam power now is possible with the opening of the new Elkhorn Tunnel, officials said, pointing out that maintenance and servicing of one type of power is a great advantage in railroad operation.

Dealer Salesmen Get Training

A complete sales-training course for retail coal personnel is to be made available in September by Coal Heating Service Div., NCA. It will cover the fundamentals of successful selling and will be especially designed to assist coal men in applying those fundamentals to present-day sales problems. The program is being planned to help fill the industry's need for more-effective selling techniques to put coal on a better competitive footing in the home-heating market. J. Nelson Stuart, CHS Div. manager, reported.

Bluefield Coal Show to Attract 250 Exhibitors

More than 250 organizations from 20 states will show equipment and machinery at the Southern Appalachian Industrial Exhibit, to be held Aug. 16-19 in Bluefield, W. Va., E. C. Luther Jr., general chairman, announced last month. Held every 2 yr and popularly known as the Bluefield Coal Show, the exhibition attracted more than 35,000 registered visitors in 1948, and attendance this year is expected to pass the 40,000 mark, Mr. Luther predicted.

B. B. Housman, long-time director of the show, reported that all of the 230 booths available will be occupied and that numerous requests for exhibition space had been turned down because of lack of space. An additional 25 exhibitors will display their machinery on grounds outside the N. & W. Freight Station, which as in the past will house the exhibit.

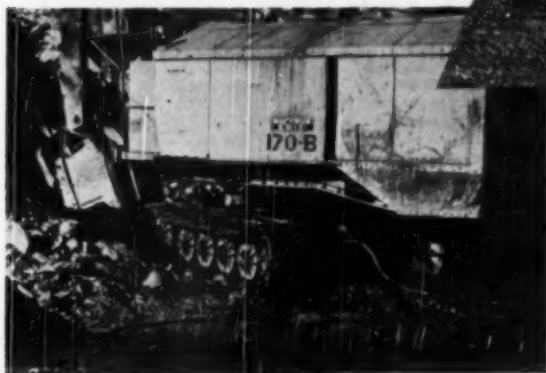
Of unusual interest in recent years has been the Gadget Contest, which is open to coal-mining inventions and "gadgets" from any section of the country. The entries are judged and awarded prizes on the basis of their usefulness and possibilities for manufacture.

The Pioneer Miners' Reunion will again be held on the last day of the program. Open to miners who have worked safely in coal mines for at least 50 yr, the event attracted more than 200 Pioneers in 1948.

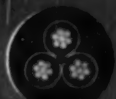
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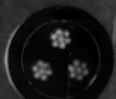
IT'S A TOUGH LIFE that electric shovel cable has to face. That's why Hazacord Shovel Cable is specially designed and constructed with the extra strength and durability that pays off in this severe service. Take Hazacord's outside protection—the Hazaprene ZBF Sheath. It's a double-layer, reinforced sheath that's mold cured under pressure to form a dense, homogeneous wall with tire-tread toughness and resiliency. Compounded with neoprene, it's unaffected by oil, acids, water, and sunlight. Yet with all the life-extending toughness you get with Hazacord Shovel Cable, ample flexibility for easy handling is retained.



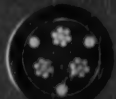
TO KEEP SHOVELS WORKING Hazacord is designed-for-the-job with many "inside" features as well that give you extra protection against cable failure. Long-lived, electrically stable, heat-resisting Performite insulates each conductor; permanently colored Okobestoprene Tape (a non-fibrous asbestos-neoprene material developed by Okonite) is precision wrapped around each insulated conductor. It seals into a flame- and moisture-resistant, non-rotting protective covering that also provides flexibility and permanent circuit identification. For moisture tightness at cable ends, and added cushioning qualities, Hazaprene fillers are used in conductor interstices instead of ordinary fibrous material.



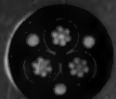
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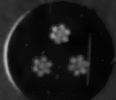
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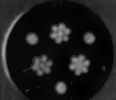
TYPE SM-C



TYPE SM-D



TYPE W



TYPE G

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INDUSTRY MEETING—A Special Coal Age Staff-Written Report



COAL PREPARATION—George R. Higinbotham (seated, left), vice president—operations, Consolidation Coal Co. (W. Va.), and president, West Virginia Coal Mining Institute; R. L. Sutherland, combustion engineer, Truax-Truax Coal Co.; and W. H. Lesser, Pierce Management, Inc.; George Kennedy (standing, left), preparation engineer, Rochester & Pittsburgh Coal Co.; H. E. Criner, research director, Hayl & Patterson, Inc.; and D. A. Dahlstrom, assistant professor, Northwestern University.

Varied Discussions at Joint Meet of W. Va. Coal Mining Institute, Central Appalachian Section, and Coal Division, AIME, Cover Latest Developments on Surface and Underground Mining with Augers, Cyclone-Thickener Operation, Liquid-Solid Cone as a Deslimmer, Sand-Cone Washing, Stream-Pollution Problems and Control, Combustion Tests on Virginia Coals and Coal Analyses From the User's Standpoint.

Three Groups Join in Charleston Meet

AUGER MINING, cyclone thickeners, sand-cone washing plants, stream pollution, coal analysis, and combustion of mixtures of Virginian-anthracite culm and bituminous coal were topics at a joint meeting of the West Virginia Coal Mining Institute, the Central Appalachian Section, AIME, and the Coal Division, AIME, held at the Daniel Boone Hotel, Charleston, W. Va., June 16-17.

On hand to conduct the meeting were: William A. Staab, mining engineer, Calcium Chloride Association, chairman of the Central Appalachian Section; George R. Higinbotham, vice president—operations, Consolidation Coal Co. (W. Va.), president of the West Virginia Institute; and Carroll F. Hardy, chief engineer, Appalachian Coals, chairman of the Coal Division.

At the banquet, with Mr. Hardy serving as toastmaster, the speaker was Charles E. Mahan Jr., vice president and counsel, New River Co. Chairmen and vice chairmen of the three technical sessions were: Mr. Higinbotham and R. L. Sutherland, combustion engineer, Truax-Truax Coal Co.; Henry F. Hebley, research consultant, Pittsburgh Consolidation Coal (Continued on page 155)



WATER POLLUTION—L. C. McCabe (seated, left), U. S. Bureau of Mines; Kenneth S. Watson, assistant director, Ohio River Valley Water Sanitation Commission; and Henry F. Hebley, research consultant, Pittsburgh Consolidation Coal Co.; S. A. Braley (standing, left), Mellon Institute; and George D. Beal, assistant director, Mellon Institute.



AUGER MINING, COAL COMBUSTION AND ANALYSES—Fred K. Prosser (seated, left), general coal traffic manager, N. & W. Ry.; and Orville R. Lyons, preparation engineer, Hayl & Patterson, Inc.; C. Hardy Long (standing, left), assistant professor, VPI; Donald M. Bondurant, assistant professor, W. Va. University; and Fred M. Reiter, Dayton Power & Light Co.



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SUPERVISORS of Blue Diamond No. 1 mine at presentation of its third Holmes Association award include: Top row—Arthur McIntosh (left), Hansford Smith, Ancy Baker, Noah Wright, Emmet Suttles and Clyde Bowen. Second row—Paul Myers, Arlie Napier, Charles P. Campbell, Kenneth Williamson, Troy Stidham, Rolan Eversole and Henry Williams. Bottom row—Charlie Campbell, Ed Couch, Sam Eversole, Chester Hogan, Andrew Caldwell, Walter Williamson, Wilgus Durbin and Matt Cross.

Kentucky Mine Gets Third Holmes Award

AT CEREMONIES attended by Bureau of Mines officials and others, the No. 1 mine of the Blue Diamond Coal Co., Blue Diamond, Ky., May 22 was presented with its third Joseph A. Holmes safety award since 1939.

The mine supervisory staff and some 700 miners witnessed the presentation, which was broadcast over Station WKIC and also was the subject of a front-page illustrated article in the Hazard, Ky., *Herald* the next day. Frank Vance, superintendent, accepted the award for the mine from W. H. Tomlinson, supervising engineer in charge of the USBM station at Norton, Va., who made the presentation on behalf of the Holmes Association.

Other speakers on the program were: Robert Dickson, director of safety, Kentucky River Mining Institute; John E. Jones, senior USBM inspector in the field; Aulman Taylor, chairman, UMW local safety committee; and Henry Richards, safety engineer for the company.

The award was made for more than 5 yr of operation without a fatality, from Oct. 26, 1944, to Jan. 31, 1950, during which time 4,300,790 tons of coal was mined. The record had continued unbroken up to the time of the



FRANK VANCE, superintendent, Blue Diamond No. 1 mine, accepted the award on behalf of the supervisory force and miners.

presentation and reportedly was unequalled by any other mine or mining company in the field.

Mr. Vance has been associated with the Blue Diamond Coal Co. for the past 27 yr, and has been with the No. 1 mine since Jan. 15, 1930. He is a director and a past-president of the Kentucky River Mining Institute and also is president of Kentucky Post No. 2 of the National Mine Rescue Association. Ancy Baker, general mine foreman, has had 23 yr of experience at No. 1 mine.

New Anthracite Power Plant Largest in the World

The world's largest anthracite-fired steam electric power plant, built by the Pennsylvania Power & Light Co. at Shamokin Dam, near Sunbury, was formally dedicated June 21. Harold E. Stassen, president of the University of Pennsylvania, and Charles E. Oakes, company president, were speakers at the ceremonies. Located on a 259-acre tract along the Susquehanna River, the 150,000-kw plant, already the world's largest of its kind, will be further increased by a 100,000-kw addition to be completed in 1951.

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COAL MEN ON THE JOB



IN THE OFFICE, Bolair [W. Va.] No. 1 mine, Perdee & Curtin Lumber Co.: D. C. Curtin (left), assistant to the general manager; M. R. Weaver, superintendent, Bolair No. 1; F. K. Day, general superintendent; E. E. Curtin, general manager; and George Curtin, president, hold one of their regular planning sessions.



CRICHTON NO. 4 MINE, Johnstown Coal & Coke Co., Nettie, W. Va.: C. C. Butcher (left), section foreman, and W. H. Sealing, superintendent.



"EXTRACURRICULAR SESSION" after adjournment of a meeting of the Eastern Kentucky Electrical & Mechanical Institute at Pikeville, Ky., included: George Ramey (left), Mayo Vocational School; L. L. Fleishman Jr., Mine Safety Appliances Co.; M. C. Mutter, foreman, Kentucky-West Virginia Power Co.; R. D. Groer, electrical engineer, Inland Steel Co.; George Leatherman, superintendent, power and maintenance department, Inland Steel Co.; C. H. Hodgson, district manager, Mine Safety Appliances Co.; Hunter Thomas, shop foreman, Inland Steel Co.; J. H. Mosgrove, secretary, Big Sandy-Elkhorn Coal Mining Institute; O. J. Williams, electrical engineer, Utilities Elkhorn Coal Co.; and C. A. McKinney, general superintendent, Kentucky-West Virginia Power Co.

More "Coal-Men" pictures appear on other pages following.

Personal Notes

Davis Read, chief engineer, West Kentucky Coal Co., Madisonville, Ky., was planning to retire Aug. 1, according to announcement by Hooper Love, president of the company. Mr. Read, who has been associated with the organization since 1908, will continue in an advisory and consulting capacity after his retire-

ment. Moss Patterson, former chief of the Kentucky Department of Mines and Minerals and executive assistant to Mr. Love since last March, will succeed Mr. Read as chief engineer.

O. A. Lilly, coal inspector of the Winding Gulf group of EG&FA mines since 1946, has been promoted to division preparation engineer, succeeding M. N. Powers, resigned.

R. E. Zimmerman, chief of the Mineral Preparation Div., Pennsyl-

vania State College, has left for Turkey, where he will act as a consultant for the Koppers Co., which is supervising the development and modernization of the Turkish coal basin in the Zonguldak area along the Black Sea.

John C. Bolinger Jr. has been appointed assistant to the president of Lehigh Navigation Coal Co., Inc., Lansford, Pa., according to a recent announcement by Evan Evans, president. Mr. Bolinger has served as assistant secretary of the Lehigh Coal & Navigation Co., the parent organization, since 1947.

E. C. Perkins, formerly manager of sales, Appalachian Coal, Inc., has been named vice president of the Webb Coal Mining Co., Charleston, W. Va., and president of its sales organization, the Webb Fuel Co.

James S. Conley, formerly vice president, has been elected president of the Wyatt Coal Co., Wyatt Coal Sales Co. and MacAlpin Coal Co., Charleston, W. Va. Mr. Conley succeeds the late D. W. Martin.

A. D. Sisk, Pikeville, Ky., recently was reappointed chief of the Kentucky Department of Mines and Minerals for a 4-yr term beginning on the expiration of his present term on July 13. Mr. Sisk was originally named to the post in 1948 to fill an unexpired term that began in 1946.

William Styche has been promoted from assistant mine foreman to general assistant mine foreman at Montour No. 10 mine, Pittsburgh Coal Co., Library, Pa. Peter Yunkum and Frank Yopek, formerly firebosses, have been made assistant mine foremen, and Albert Borchick has been appointed a fireboss.

James Westfield has been made acting chief, Accident Prevention and Health Div., Region 8, USBM, Pittsburgh, succeeding the late George W. Grove.

Jesse F. Core, formerly chief engineer for the coal mining operations of the Youngstown Sheet & Tube Co., has been named chief engineer for the Island Creek Coal Co., Pond Creek Pocahontas Co. and Marianna Smokeless Coal Co., according to an announcement by J. L. Hamilton, vice president. Prior to his association with Youngstown Sheet & Tube, Mr. Core was employed in various capacities in the engineering and operating departments of the Pittsburgh Coal Co. He will have offices at the companies' operating headquarters in Holden, W. Va.

Karl T. Miller, with The Hudson Coal Co. continuously since October, 1910, has been named safety engineer, to succeed **John D. Cooner**, who recently resigned to join the USBM. During his career with the company, Mr. Miller has filled various posts in the engineering and operating departments and since 1945 has been dust engineer in charge of dust control.

Joseph Q. Berta, formerly superintendent, Superior mine, The Union Pacific Coal Co., Rock Springs, Wyo., has been appointed superintendent at Reliance mine, succeeding **William Spence**. **Tony Toucher Jr.**, former assistant superintendent at Superior, has been named to succeed Mr. Berta, and **George Powers**, formerly mine foreman, has been promoted to assistant superintendent at Superior.

Changes among supervisory personnel at EG&FA mines include the following: At Eccles Nos. 5 and 6 mines, **Clyde Perry** now is general outside foreman. **A. B. Hook**, formerly at Glen White, now is a section foreman at Eccles No. 5 and **Clarence Rowland**, formerly of Everettville, is foreman on the third shift. **Lester Thompson**, and **Caleb Johnson** have been promoted to section foremen at Wharton No. 1 mine. At Keystone, **Dominic Peretti** has been made foreman of a mechanical section.

McGarvey Blankenship, formerly cutting-machine operator has been promoted to section foreman at Kopperston No. 1 mine. **Thomas P. Shabdue**, one of the earliest mine foremen at Powellton No. 6 mine, has retired. Mr. Shabdue recently received a 40-yr service pin from the company. **Robert Mayes** has been made a conveyor foreman at this mine. **G. H. Tipton**, who went into coal mining for himself sometime ago, has returned to Helen No. 11 mine as section foreman.

Thomas Green, associated with Stonegate Coke & Coal Co. since 1917, has retired as superintendent of the Imboden mine, Imboden, Va., according to an announcement by H. W. Meador, vice president. **L. F. Minor**, general mine foreman for several years, has been named superintendent to succeed Mr. Green. **Elbert Edens**, formerly assistant mine foreman, has been made general mine



Indian Preparation Society Concludes Active Year

The Indiana Coal Preparation and Utilization Society, Terre Haute, Ind., ended its current season of regular meetings May 26 with a program that included a talk by **W. A. Weimer** (left, above), chief engineer, Northern Illinois Coal Corp., on "Pumping Coal-Washery Refuse." Officers of the society shown with Mr. Weimer are: president, **J. S. Bond** (left), combustion engineer, Enos Coal Mining Co.; vice president, **Roy Ault**, superintendent Shasta Coal Corp.; and secretary-treasurer, **C. C. Lydick**, managing director Coal Trade Association of Indiana.

Organized in 1944, the society now

foreman, and has in turn been succeeded by **L. N. Christian**, formerly section foreman. **J. M. Lowman**, superintendent of the Stonegate mine and for many years previously superintendent of the Dunbar mine, has been named to head the company's power and mechanical department. **W. L. Young**, formerly assistant superintendent of the company's Glenbrook (Ky.) mine, has been appointed superintendent at Stonegate, to succeed Mr. Lowman.

L. M. Pratt retired last month as vice president and director of the Kemmerer Coal Co., Frontier, Wyo. Mr. Pratt completed 46 yr of service with the company on July 1. He also was a vice president and director of the Gunn-Quealy Coal Co., Quealy, Wyo., and an officer or director of a number of other business organizations.

With the affiliation of a group of associates, **P. R. Paulick**, consulting mining engineer, offers a broader service in design and application in the fields of modern mining methods, mine-mechanization systems and cost analyses, both in the United States and abroad, according to recent announcement. The new organization is now known as "P. R. Paulick and Associates," with headquarters on South Park Rd., Library, Pa.

Charles Boley has accepted an ap-

pointment as a coal-preparation technologist for the mining and geology division of the Natural Resources Section U.S. General Headquarters, Tokyo, for a period of 2 to 3 yr. Boley formerly was associated with the University of Wyoming and with the Illinois State Geological Survey.

The group's regular summer outing was scheduled to be held July 22 at Linton, Ind., and the annual Indiana Coal Conference sponsored by the society is to be held Sept. 22-23 at Terre Haute.

pointment as a coal-preparation technologist for the mining and geology division of the Natural Resources Section U.S. General Headquarters, Tokyo, for a period of 2 to 3 yr. Boley formerly was associated with the University of Wyoming and with the Illinois State Geological Survey.

Donald H. Dowlin, formerly chief engineer, Buckeye Coal Co., Youngstown Mines Corp. and the Ontario Mining Co., has been named chief engineer, to succeed **Jesse S. Core**.

Obituaries

R. E. Gailbreath, 60, general superintendent, Wisconsin Steel Nos. 1 and 2 mines of the International Harvester Co., Benham, Ky., died July 6 in the Benham hospital after a short illness. He had been superintendent at the operations for 18 yr.

Robert W. Creech Sr., 88, president of the Creech Coal Co., Twila, Ky., died July 8 at his home in Twila after a brief illness. Known as "Uncle Bob" to his many friends throughout the area, Mr. Creech had been active in coal mining for many years. He was associated with the late T. J. Asher in the construction of the first railroad from Pineville to Harlan, Ky., which opened up large



Pompey Coal Co. First-Aid Team Wins Anthracite Contest

COMPETING against 10 other teams in the 8th Annual First-Aid Contest of the Northern Anthracite Independent Operators' Association, the team representing Pompey Coal Co., Jessup, Pa., won top honors with a score of 99.93% at Russell Park, Carbondale, Pa., July 15. The winners are: Peter Dubinsky (standing, left), John Paulic, Edward Bellan, Albert Rogari, Joseph Kurilla, Myron Marcinek (sitting left), instructor, Steve Hinzay, captain, Peter Russen, and Frank Anastasio, treasurer, Pompey Coal Co. The team was awarded a cup for its permanent possession and the Association's plaque for display during the coming year. Also, each team

member received an award of \$25 in cash.

Another highlight of the meet was the presentation of a Joseph A. Holmes Safety Association certificate of honor to the supervisors and employees of Boland's Colliery, DeAngelis Coal Co., Carbondale, for producing 1,960,569 tons of coal with 3,009,090 man-hours of exposure from May 16, 1943, to March 31, 1950, without a fatality. E. H. McCleary, area engineer, Bureau of Mines, Wilkes Barre, Pa., presented the award. J. F. Munley state mine inspector, accepted the certificate for DeAngelis Coal Co. in the absence of Vincenzo DeAngelis, president.

areas of timber and coal land for development. The line later was taken over by the L. & N.

R. A. Hibbs, 53, assistant general manager, Clear Branch Coal Co., Pikeville, Ky., died June 27 in St. Mary's Hospital, Hazard, Ky.

Association Activities

Coal Producers' Association of Washington has elected new officers as follows: president, Earl R. McMillan, manager, coal department, Northwestern Improvement Co., Seattle; first vice president, William Strain, Strain Coal Co., Seattle; and second vice president, Harry Merbach, Bellingham Coal Mines, Bellingham. R. W. Clark was named secretary-treasurer, replacing James E. Ash, who died early this year. Members of the board include: Fred Bianco, James Bolde, Thomas Murphy, Harry Patrick, George Sheatsley and David Williams.

Pennsylvania Anthracite Section, AIME, has elected Henry Dierks, vice

president and general manager, Glen Alden Coal Co., as chairman, succeeding George A. Roos, vice president, Philadelphia & Reading Coal & Iron Co. Vice chairman of the group is D. C. Helms, general manager, Lehigh Navigation Coal Co. Floyd Sanders, Goodman Mfg. Co., is secretary. Directors of the organization include: J. H. Pierce, Pierce Management; W. C. Muehlhof, P. & R.; William Everett, Glen Alden; George Clark, Shen-Penn Production Co.; Edward Powell, Susquehanna Collieries Div., M. A. Hanna Co.; and John Burch, USBM.

Colorado & New Mexico Coal Operators' Association, at its annual meeting in Denver June 30, elected officers as follows: president, J. S. Besser; vice presidents, G. R. Harris and J. R. Kastler; and secretary-treasurer, O. F. Bridwell. Named to the board of directors, in addition to Messrs. Besser, Harris and Kastler, were: M. C. Anderson, W. D. Corley, Jr., L. M. Cooley, George B. Dick, W. M. Kerr, J. F. Lake, E. M. Oliver, W. H. Peltier, W. G. Plested, Sam T. Taylor, S. M. Thompson and W. J. Thompson.

Virginia Coal Operators' Association,

MEETINGS

• Southern Appalachian Industrial Exhibit: Aug. 16-19, Bluefield, W. Va.

• Central Pennsylvania Open Pit Mining Association: annual field day, Aug. 24, Arctic Springs American Legion Home, Rattlesnake Pike, near Philipsburg, Pa.

• Central Pennsylvania Coal Producers' Association: annual meeting, Sept. 14, Bedford Springs Hotel, Bedford Springs, Pa.

• Indiana Coal Preparation and Utilization Society: annual Indiana Coal Conference, Sept. 22-23, Terre Haute, Ind.

• Mining Electrical Group: exhibit, Sept. 26-28, West Frankfort, Ill.

• American Coke & Coal Chemicals Institute: annual meeting, Sept. 28-29, Skytop Lodge, Skytop, Pa.

• Coal Producers' Association of Illinois: annual meeting, Oct. 10, Springfield, Ill.

• National Safety Council: 38th National Safety Congress and Exposition, Oct. 16-20, Chicago.

• Coal Division, AIME, and Fuels Division, ASME: joint meeting, Oct. 23-25, Statler Hotel, Cleveland, Ohio.

tion, at its 31st annual meeting in Norton, Va., July 6, re-elected all its officers as follows: George H. Esser, president, secretary and treasurer; H. W. Meador, vice president; and E. H. Robinson, assistant secretary-treasurer. More than 100 members and guests attended the luncheon following the business meeting and heard Harry Gandy, Jr., of the NCA discuss the foreign oil situation and Washington developments. The meeting was followed by golf and entertainment in the afternoon.

New Classification Plan Shown at Crystal Cliffs

A new system of coal classification received a wide measure of approval at a conference on the origin and constitution of coal June 21-23, at Crystal Cliffs Geological Centre, Antigonish, N. S.

Sponsored by the Nova Scotia Research Foundation and the Nova Scotia Department of Mines, the conference was organized by D. H. D. Smith, president, Nova Scotia Research Foundation, and was opened by H. G. Mackinnon, Nova Scotia Minister of Mines. It was preceded by a meeting of the Foundation's coal board, which heard reports on the following research projects: the coal-burning stove, Prof. R. Donkin, Nova Scotia Technical College; underground gasification, Dr. A. C. Culbertson, dean of chemistry, Mt. Allison University; geophysical mapping of coal seams, Prof. J. E. Blanchard, Dalhousie University; coal occurrence in Inverness County, Dr. B. J.

Keating, St. Francis Xavier University.

Prior to the presentation of the coal-classification plan, Dr. R. B. McKay, chief, Coal Div., Geological Survey of Canada, summarized the organization of a new coal laboratory at Sydney for mapping, geological and other research into the occurrence and reserves of Nova Scotia coal. The new laboratory was made possible by the joint cooperation of the coal producers, the Nova Scotia Research Foundation and the Nova Scotia Department of Mines. It started operations in January, 1949.

The new classification plan designed to replace the present varying systems and thus be adaptable to world-wide use, was developed by Drs. T. B. Haites and P. A. Hacquebard, who head the new Sydney laboratory. It was presented at the conference by Dr. Hacquebard.

The importance of uniform classification was urged by Dr. B. C. Parks, United States Bureau of Mines. Others joining in the discussion included: Dr. Gilbert H. Cady, senior geologist, Illinois Geological Survey; Dr. W. L. Whitehead, in charge of the Crystal Cliffs summer school; Dr. A. Lahiri, Fuel Research Institute, India; Dr. A. T. Cross, West Virginia Geological and Economic Survey; Dr. H. H. Storch, chief, development board, Synthetic Liquid Fuels Section, U. S. Bureau of Mines; Dr. A. H. Lang, secretary, Alberta Research Council; and Dr. McKay.

Other conference topics included the following:

The role of fossil plants and spores in coal classification and correlation, Dr. Cross and Prof. John H. Hoskins, department of botany, University of Cincinnati.

Application of new techniques to the thermal analysis of Nova Scotia coals, Dr. Whitehead.

Geochemical investigation of coals, Dr. Irving Breger, Massachusetts Institute of Technology.

State-Wide Safety Meet Planned in Pennsylvania

Some 37 coal-company safety teams are expected to compete for the state-wide championship at the 9th Annual First Aid Meet of the Pennsylvania State Bituminous Safety Association, to be held at the Cambria County Fair Grounds, Ebensburg, Pa., Saturday, Sept. 9.

Sponsored by the Pennsylvania Department of Mines, the event will include top-ranking teams from the various sectional meets to be held throughout the state during the summer. Meets already held by safety associations included those of the Central Pennsylvania Safety Association, June 10, at Central City, and the North Central and Moshannon Safety Associations, June 17, at Punxsutawney.

Other meets scheduled for July and

August were: North Central Safety Association, July 22, Indiana; Southwestern Pennsylvania Safety Association, July 29, at Uniontown or California; Westmoreland County Safety Association, Aug. 12, Latrobe; and Allegheny-Kiski Safety Association, Aug. 26, New Kensington.

W. Garfield Thomas is president of the association and Dennis J. Keenan is general chairman and director of the meet.

BCR Mining Development Extended for 2 More Yr

Subscribers to the mining development program of Bituminous Coal Research, Inc., June 23, voted funds to continue the development work for an additional 2-yr period. The formal business meeting, held in Huntington, W. Va., was preceded by a tour of the MDC's laboratory.

A luncheon address was given by E. R. Price, manager, coal properties, Inland Steel Co., Wheelwright, Ky., who reviewed the background and history of the program. Dr. Charles E. Lawall, assistant vice president, C. & O., and chairman of the committee, reported on its activities. He was followed by Gerald Von Stroh, director of development, who presented a technical report. T. F. McCarthy, vice president, Clearfield Bituminous Coal Corp., outlined the future program.

EQUIPMENT APPROVALS

Seven approvals of permissible equipment were issued by the U. S. Bureau of Mines in June, as follows:

Jeffrey Mfg. Co.—Type VD-8 vertical drilling machine; one motor, 8½ hp, 250 and 500 v, dc; Approvals 2-737 and 2-737A, respectively; June 2.

Joy Mfg. Co.—Type U-179-70PKK elevating conveyor; one motor, 7½ hp, 550 v, ac; Approval 2-738A; June 12.

Joy Mfg. Co.—Types 4JCM-1AG/H/HY/NN and 4JCM-2G continuous miners; seven motors, two 65 hp, three 10 hp, and two 3 hp; 220 and 440 v, 60 cycles, 380 and 400 v, 50 cycles, ac; Approvals 2-739 and 2-739A; June 12.

Joy Mfg. Co.—Type WK83T air compressor; one motor, 30 hp, 230 v, dc; Approval 2-740; June 19.

Goodman Mfg. Co.—Type E-11 shaker conveyor; one motor, 10 hp, 380 v, ac; Approval 2-741A; June 23.

Jeffrey Mfg. Co.—Class 14, Form 3, electric drive unit for blower fan; one motor, 3 hp, 220 and 400 v, ac; Approvals 2-742 and 2-742A, respectively; June 26.

Jeffrey Mfg. Co.—Power unit for underground conveyor; one motor, 40 hp, 230 v, dc; Approval 2-743; June 29.

Preparation Facilities

Rose Hill Coal Co., Roseville, Ohio—Contract closed with K. Prins & Associates for one Model UW-100T9 Prins unit washer (package-type) to handle 100 tph of 6-inx14-mesh coal; r-o-m to be crushed to minus 6 in and minus 14 mesh removed from the raw-coal feed; 6-inx14-mesh coal to be sized on present r-o-m screens and loaded as 1-inx14-mesh stoker, 1x3-in nut and 3x6-in egg.

Lone Star Coal Co., Brazil, Ind.—Contract closed with Western Machinery Co. for one No. 2C Wemco Mobil-Mill to wash 30 tph of coal sized at 4x1¼ and 1¼x½ in.

D. & B. Coal Co., Buck Run, Pa.—Contract closed with Wilmont Engineering Co. for two Type A jigs for preparing nut and pea; total feed capacity, 30 tph.

Consagra Coal Co., Blakely, Pa.—Contract closed with Menzies Separator Co. for two 2-ft Menzies cones, one to clean barley and the other to clean No. 4 buckwheat coal, feed capacity, 7 tph each; and for one 3-ft Menzies cone to clean pea, feed capacity, 12 tph.

Harry J. O'Brien, Suedberg, Pa.—Contract closed with Menzies Separator Co. for one 2-ft Menzies cone to clean rice and barley; feed capacity, 7 tph.

Blackwood Construction & Supply Co., Mt. Carmel, Pa.—Contract closed with Menzies Separator Co. for three 8-ft Menzies cones, feed capacity of each, 70 tph; the separate units to clean egg and oversize coal, stove and nut, and pea and buck.

Christian Colliery Co.—Contract closed with Jeffrey Mfg. Co. (by Kanawha Mfg. Co.) for No. 100 unit washery, for 3x½-in coal; capacity, 70 to 80 tph.

Clean Coal Co., Bellaire, Ohio—Contract closed with Jeffrey Mfg. Co. for No. 200 unit washery, for 6x½-in coal; capacity, 100 tph.

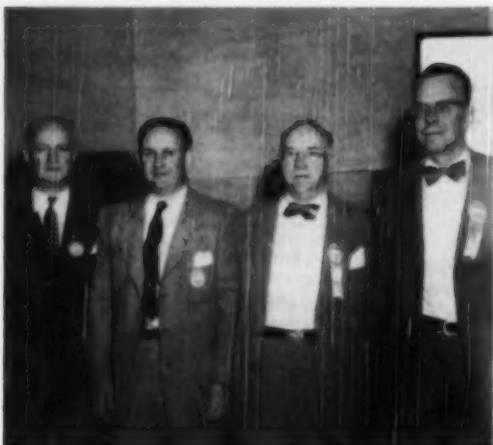
Glenn Brook Coal Co., Weirton, W. Va.—Contract closed with Jeffrey Mfg. Co. for No. 100 unit washery, for 6x½-in coal; capacity, 70 tph.

Cannelton Coal Co.—Contract closed with Jeffrey Mfg. Co. (by Kanawha Mfg. Co.) for 8-cell Baum jig, for 5x0-in coal; capacity, 450 tph.

Buckeye Coal Co., Nemacolin, Pa.—Shipment by Deister Concentrator Co. of five SuperDuty Diagonal-Deck No. 7 coal-washing tables.

Hanna Coal Co., Central Preparation Plant, Georgetown, Ohio—Shipment by Deister Concentrator Co. of five SuperDuty Diagonal-Deck No. 7 coal-washing tables and three Model 108 Concenco revolving feed distributors.

Industry Meeting — A Special Coal Age Staff-Written Report



CABLE GROUNDING AND TRANSPORTATION TRENDS—H. R. Stoddard (left), Simplex Wire & Cable Co.; Gil Butler, Link-Belt Co.; F. W. Whiteside, institute secretary-treasurer; and Glenn E. Sorensen, session chairman and institute president.



ROOF BOLTING—John Peperakis (left), Kaiser Steel Corp.; W. J. Johnson, Sheridan-Wyoming Coal Co.; Eddie Morgan, U. S. Bureau of Mines; Richard Shaw, Ingersoll-Rand Corp.; Joel N. Van Sant, St. Louis, Rocky Mountain & Pacific Co.

New Developments in Equipment, Methods and Safety Surveyed by . . .

Rocky Mountain Coal Mining Institute

Cable Grounding, Mining and Loading Machines, Roof Bolting, Transportation, Preparation, Mine Development and Safety Are Themes of Technical Sessions at 46th Annual Meeting in Glenwood Springs

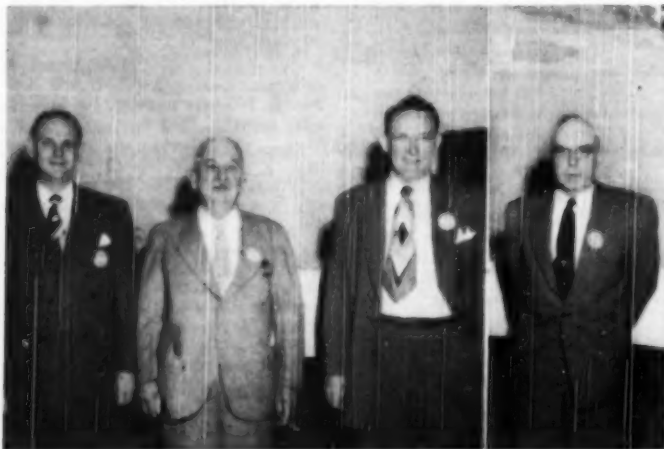
CABLE GROUNDING PROBLEMS, transportation and preparation trends, modern mining and loading-machine characteristics, roof-bolting experiences, mine planning and safety were program features of the 46th annual meeting of the Rocky Mountain Coal Mining Institute, Hotel Colorado, Glenwood Springs, Colo., June 19-21.

The industry must continue to be strong and competitive to effectively fight the battle against socialism, stated Glenn E. Sorensen, general manager, Kemmerer Coal Co., Kemmerer, Wyo., and institute president, in opening the three-day meeting.

At the opening session, Mr. Sorensen presiding, over 150 members and guests heard grounding problems with portable cables discussed by H. R. Stoddard, sales engineer, Simplex Wire & Cable Co., Chicago, Ill.; and trends in transport and preparation, by Gil Butler, engineer, mining division, Link-Belt Co., Chicago, Ill.

Cable-grounding problems concern mine operators from the standpoints of personnel safety and equipment protection, Mr. Stoddard said. Increasing use of mechanized equipment with higher power ratings and the growing awareness that local ground connections to earth give little or no protection to personnel are bringing about the increased use of metallic wires for better ground-return circuits.

Mr. Stoddard pointed out that in strip-mine distribution systems using



MINE DEVELOPMENT AND CONTINUOUS MINING—W. J. Phillips (left), Sunnyhill Coal Co.; John Sidle, Clayton Coal Co.; A. Lee Barrett, Joy Mfg. Co. **LOADING MACHINES**—George L. Clements, Goodman Mfg. Co.



SAFETY AND EFFICIENCY—Thomas Allen (left), Colorado; Lyman Fearn, Wyoming; R. H. Dalrymple, Utah; E. H. Denny, U. S. Bureau of Mines; J. A. Garcia, New Mexico; E. R. Maize, National Coal Association; W. J. Johnson, Sheridan-Wyoming Coal Co.; K. V. Cammack, U.S.G.S.

a solidly grounded neutral at the supply transformers there is a possibility of having heavy ground currents and, therefore, high voltage gradients in the ground-return circuit. On the other hand, a resistance- or impedance-grounded-neutral system has relatively low ground currents, and better control of voltage gradients in the ground-return circuit is possible.

In describing the portable cables now available, Mr. Stoddard used the designations in Insulated Power Cable Engineers' Association specifications, as follows:

Type W has no provision for a ground wire. When used on a 3-phase system, a separate wire must be provided for the ground return or a 4-conductor cable must be used.

Type G has three insulated power conductors and three bare or fabric-covered ground wires which, in parallel, have approximately 50% of the cross-section area of the power conductors.

Type SH-A, B, C and D are shielded with braided copper for protection of personnel, cable flexibility and control of electrostatic stresses in the cable insulation. In general the shielding is not designed to carry phase-to-ground fault current, but is included mainly to protect men who must handle the cable.

Mr. Stoddard concluded that: "It appears that some form of the solidly-grounded-neutral system, which employs a means to limit fault current, offers the best procedure yet devised for protecting personnel from the shock hazard."

Trends in transportation and preparation point to higher-capacity units, synchronized operations and fully-automatic operation, Mr. Butler de-

clared. Using slides to illustrate some of the modern installations, Mr. Butler pointed out that advances in design of preparation equipment parallel advances in mechanized production.

Automatic car-dumping is a feature at many modern plants, with car-

feeding, spotting, weighing and dumping following each other as steps in an automatic sequence.

Other installations described include two side-by-side car dumps at Robena mine, H. C. Frick Coke Co., Robena, Pa. Each of these units dumps 10 6-ton cars at once. Also, a 60-in belt conveyor at Robena takes 2,800 to 3,000 tph from these multiple dumps and elevates the coal 171 ft in a distance of 731 ft. At the same plant, the widest belt in the industry, 72 in, serves the blending bins.

In southern Illinois, a 42-in-wide belt is being installed to convey 1,200 tph a horizontal distance of 3,167 ft and elevate 862 ft. The belt will operate at 623 fpm under a tension of 85,000 lb, and will be driven by a 1,500-hp. motor through a herringbone speed reducer and an eddy-current clutch.

Mr. Butler also described a special steel-cord belt with a horizontal center-distance of 10,900 ft and a drop of 136 ft over this distance. This 30-in belt carries 216 tph at a belt speed of 300 fpm.

Among recent advances in preparation designs are floating drives and suspension for larger shaker units. Oscillating thrust is absorbed by suspended weights, thereby greatly reducing the rigid supporting structure required in the building.

Mr. Butler stated that one of the trends in preparation is to limit manual picking to only plus 6- and 8-in sizes. Manual picking below this range is expensive and inefficient.

Heavy-media separation, with magnetite as the separating medium, is one of the most widely discussed and investigated cleaning practices, Mr. Butler declared in describing a modern heavy-media plant. A motion picture of an operating installation was shown.

A description of the Goodman 660 loading machine by G. L. Clemens, manager, Salt Lake City office, Goodman Mfg. Co., opened the Monday afternoon session. Walter J. Johnson, president, Sheridan-Wyoming Coal Co., Monarch, Wyo., was chairman. Also, a symposium on roof bolting was held, with the following speakers participating: Edward Morgan, mining engineer, roof-control section, Bureau of Mines, Denver; John Peperakis, assistant manager, Sunnyside mines, Kaiser Steel Corp., Sunnyside, Utah; Richard Shaw, Ingersoll-Rand Corp., Denver; and Joel N. Van Sant, St. Louis, Rocky Mountain, Pacific Co., Baton, N. M.

Loading-machine design, said Mr. Clemens, in describing the Goodman 660, is complicated by dimensional limits that force rejection of many possible ideas. Designs usually must be derived empirically, and final evaluation is possible only after the machine is in service.

The new Goodman 660 loading machine is capable of cleaning a room 18 ft wide, at a rated capacity of 8½

(Continued on page 161)

1950-51 Officers Rocky Mountain Institute

President—A. B. Foulger, vice president and general manager, Lion Coal Corp., Ogden, Utah.

Secretary-Treasurer—F. W. Whiteside, consulting engineer, Denver.

Vice Presidents—J. B. Burns, manager of operations, Colorado & Utah Coal Co., Denver, for Colorado; G. E. Gildroy, president, Bair-Collins Co., Roundup, Mont., for Montana; J. N. Van Sant, safety engineer, St. Louis, Rocky Mountain & Pacific Co., Raton, N. M., for New Mexico; C. P. Heiner, consultant, Utah Fuel Co., Salt Lake City, for Utah; and H. C. Livingston, vice-president, operations, The Union Pacific Coal Co., Rock Springs, for Wyoming.

Executive board—Colorado, Frank Bennett, Colorado Fuel & Iron Corp., and Ralph Moore, Union Supply Co.; New Mexico, Andrew Gracia, St. Louis, Rocky Mountain & Pacific Co., and John A. Garcia, mine inspector; Montana, S. H. Clarke, Sheridan-Wyoming Coal Co., and J. Brophy, Brophy Coal Co.; Utah, Burt B. Brewster, Salt Lake Mining & Contracting Review, and Walter Clarke, Independent Coal & Coke Co.; Wyoming, W. J. Johnson, Sheridan-Wyoming Coal Co., and G. E. Sorenson, Kemmerer Coal Co.

INDUSTRY MEETING—A Special Coal Age Staff-Written Report



NOVA SCOTIA OFFICERS—David G. Burchell (left rear), retiring president; Sydney C. Miffen, secretary; Dr. Donald J. MacNeil, first vice president; John H. Fraser, now president; and J. A. Russell, second vice president, Mining Society of Nova Scotia.



HONOR STUDENTS—Joseph Sutherland (right), Dominion Coal Co.; J. C. Marsh, Bras d'Or Coal Co.; and Adrian Campbell, Dominion Coal Co., with H. G. MacKinnon, Nova Scotia Minister of Mines (left), and L. A. Forsyth, president, Dominion Iron & Steel, Ltd.



SAFETY AWARD—Archie Macdonald receives John T. Ryan Trophy awarded Princess colliery. Presentation was made by Dr. A. O. Dufresne, president, Canadian Institute of Mining and Metallurgical Engineers (rear). At the right, Mr. Macdonald poses with R. R. Dickson (left), superintendent, Old Sydney Collieries Ltd., operating Princess colliery; R. M. McColl, Mine Safety Appliances Co.; L. J. MacDonald, assistant superintendent; and James Guest, superintendent of industrial relations.



Mining, Preparation and Safety Explored At 63rd Nova Scotia Society Sessions

FOLLOWING A REVIEW of mining activities in the province, members of the Mining Society of Nova Scotia, at the 63rd annual meeting at Kentville, N. S., June 26-27, discussed safety, transportation, roof-bolting and cleaning, with speakers from the United States carrying the ball.

The sessions were opened by David G. Burchell, general manager, Bras d'Or Coal Co., Ltd., retiring president. In his address Mr. Burchell emphasized the dangers of the growth of communism and socialism and stressed the need of immediate action to forestall further growth, with corresponding loss of liberty for the in-

dividual. He particularly deplored the growing tendency to ask for greater services from the government, pointing out that as each such request is granted another degree of liberty is lost. The need is for a return of Christianity and truth, and for a renewed realization of the fact that preservation of freedom requires assumption of responsibility by the individual for the well-being of himself and his family.

Following Mr. Burchell's address, these new officers were installed:

President—J. H. Fraser, superintendent, Sydney plant, Dominion Iron & Steel, Ltd.

Vice Presidents—Dr. D. J. MacNeil, professor of geology, St. Francis Xavier College, and J. A. Russell, mechanical engineer, Dominion Coal Co.

Secretary—Sydney C. Miffen, technical assistant to the general manager, Dominion Coal Co. Ltd. (re-elected).

Safety Trophy to Princess—Other special events were: Monday—awards to outstanding students and an address by L. A. Forsyth, president, Dominion Iron & Steel Ltd.; Tuesday—presentation of the John T. Ryan Regional Safety Trophy of the Canadian Institute of Mining and

COAL MEN ON THE JOB



RICHLAND MINE, Costanzo Coal Mining Co., Wheeling, W. Va.: Carl E. Hughes (left), general mine foreman; George Nicholas, assistant general mine foreman; Steve Benyo and Charles Barth, section foremen; William Pennington, chief electrician; and Ludwig Nemel, section foreman.



CLEARCO (W. VA.) MINE, Clearco Coal Co.: W. R. Anderson (left, front), electrician; H. B. Burleson, section foreman; Fred Permenter, conveyor foreman; Albert Gibson (left, rear row), Cecil Sparks and W. A. Campbell, section foremen; and F. E. Hall, general mine foreman.

More "Coal-Men" pictures appear on other pages following.

Metallurgical Engineers to the Princess colliery of Old Sydney Collieries, Ltd. The presentation was made by Mr. A. O. Dufresne, president of the Institute, and the trophy was received by Archie Macdonald, who was in charge at Princess when the record was made.

Outlining the scope of the Dosco operations—both steel and coal—and their place in the economy of the Dominion, Mr. Forsyth expressed confidence in the Canadian future. But a necessary condition, if that future is to be realized, is resistance to pressure for greater state control, maintenance of the spirit of independence, and maximum production of goods and services by the individual. All these he contended, are simply the marks of good citizenship.

Five Students Honored—Awards to students for excellence in examinations and college studies were presented by H. G. MacKinnon, Nova Scotia Minister of Mines, who briefly discussed market possibilities, the growing competition of other fuels and the need for reducing cost of

production. Those present to receive the awards were:

Adrian Campbell, field-inspection staff, Dominion Coal Co., Ltd.—highest grade in the examination for mine manager.

J. C. Marsh, Bras d'Or Coal Co., Ltd., outstanding graduate of Nova Scotia Technical College.

Joseph Sutherland, overman, Dominion Coal Co., Ltd.—highest grade in the overmen's examination.

Those not present for the awards were:

William Pickup, Dominion Coal Co., Ltd.—highest grade in underground managers' examination.

W. Bruce Macdonald, Calgary, outstanding student in the engineering class, St. Francis Xavier University.

Nova Scotia coal mines, said M. G. Goudge, mining engineer, Nova Scotia Department of Mines, in opening the technical sessions, have been raising efficiency through modernization, mechanization and improvements in management-labor relations. In 1947, he reported, average tons per man was 1.58. In 1949, the average

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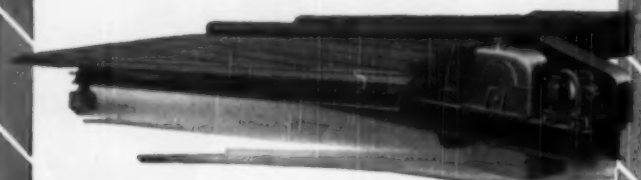
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was 2.15. Research authorities are studying the coal seams of the province, and the department is assisting in the fields of exploration and mining practice by such steps as gathering information on mining practice with a new mobile mining plant, and providing data for increasing the life of hoisting ropes by testing ropes in service with special mobile equipment. Socketing also is being studied.

Safety Progress—Reporting on recent safety improvements, Col. S. H. Ash, chief, safety branch, Health and Safety Division, U. S. Bureau of Mines, declared that a low production cost is necessary throughout the world, and with it planned health and safety programs, which promote operating efficiency, improve labor relations, promote better public relations and reduce compensation and injury costs.

Mining in the United States is definitely becoming safer, Col. Ash declared, with the fatality rates trending downward as the percentage of mechanized production rises. Other factors include increased employee and union participation in safety programs, training, reduced exposure, better supervision, and increased attention to eliminating hazards and improving the condition of plant and equipment.

Among the problems for which better solutions are necessary or which are unsolved are: better illumination at the face; improving the durability and accuracy of gas-detecting instruments; reliable portable communication equipment for emergencies; better methods of detecting and preventing misfires; trailing cables with greater flame resistance; a simple and reliable means of cutting off the power when cables are damaged; a method of preventing destruction of explosion-proof enclosures; a method of detecting defective or faulty trolley hanger insulators without disconnecting the wire; and a practicable and efficient method of removing toxic and noxious gases for diesel-engine exhausts, thus removing the hazards, as well as the prejudice, against using such equipment underground.

Commenting on observations abroad, Col. Ash expressed the opinion that water infusion to suppress dust and pneumatic stowing had application in some mines in the United States and Canada.

Discussion following Col. Ash's presentation brought out that the value of water infusion in other than clefted or bedded coal was questionable, and that management-labor cooperation is essential for maximum safety progress.

Belt Transportation—Supplementing a discussion of the engineering factors involved in the design and use of conveyors with a motion picture entitled "The Way Out," J. L. Thornton, mining division, Goodyear Tire & Rubber Co., Akron, Ohio, also outlined briefly other underground uses for belt equipment.

"Room-entry belts comprise by far the greatest conveyor-belt footage used underground, but main-entry belting and slope belting are increasing their percentage in the picture. The trend to belting is well-enough established at this time that we need have no hesitancy in accepting underground belting as the ultimate method of underground transportation in all cases where tonnage of any significance must be carried."

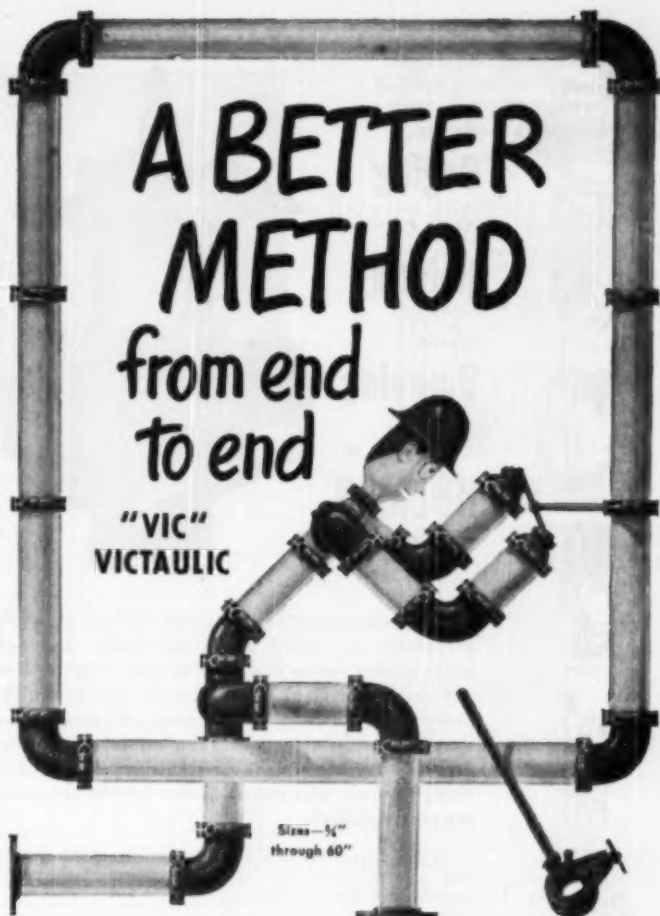
Methods of cleaning were stressed by Mr. Thornton, who pointed out that there still is much to be done. Belt safeguards, in addition to an anti-rip device, include the single wire over the belt (mechanical in principle), two-wire protection, and the plugging switch for overloading. For long-haul high-lift heavy duty, he declared, the steel-cord type of belt is the best. In discussion, Mr. Thornton stated that lubrication methods must be developed for each installation, with particular attention to preventing bursting of bearings by over-greasing. Belt-transportation cost, he declared, varies from 2 to 6¢ per ton-mile.

Roof-Bolting Progress — Tracing the history of roof-bolting, Edward Thomas, mining engineer-in-charge, Roof-Control Section, United States Bureau of Mines, stated that bolting in coal mines as known today was made possible only by mechanical mining. Earlier experiments were failures because, with hand loading, the cost could not be offset by increased efficiency at the face.

Briefing the present status and problems in roof-bolting (*Coal Age*, April, 1950), Mr. Thomas stated that at the end of 1949 over 200 companies in the United States were using bolts to support 14,000,000 sq ft of top. Since then, the number of users has grown to over 300, and the area of top supported has more than tripled. Each mine must determine its own method by trial in an experimental section. Only one accident, causing three fatalities, has occurred to date with bolting.

Although there is much theoretical material on roof control, Mr. Thomas concluded, there is little practical knowledge that can be applied by the operating man. Consequently, the Bureau is equipping a roof-control laboratory and is conducting field tests, with promising results so far. The possibility of bolting to hold down heaving bottom also is being tested experimentally. Mr. Thomas reported in discussion, which was largely concerned with exploring possibilities in holding thick layers of weak material with bolts. So far, comment indicated, the problem is largely unsolved.

Coal Preparation—Analyzing "Modern Coal Preparation Trends in the United States," C. W. Waterman, Jr., McNally-Pittsburg Mfg. Corp., in addition to describing the McNally-Brusset vacuum jig, the McNally-Norton and McNally-Mogul washers,



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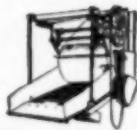
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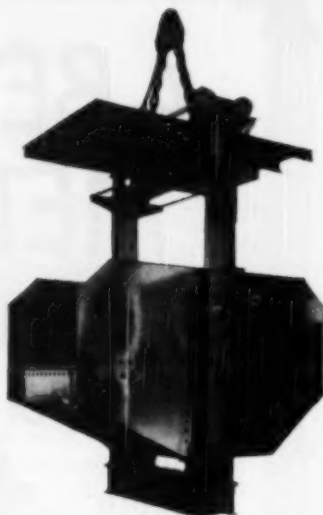


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the Carpenter centrifuge, the McNally-Vissac thermal dryer and the Gearmatic crusher, outlined trends in both equipment and practice.

The Baum-type jig, he reported, continues to hold the lead in the cleaning field, while the new vacuum jig promises efficiencies equal to those of the less-efficient wet washers—and will provide those efficiencies in spite of wide variations in the moisture content of the feed. On $\frac{3}{4} \times 0$, the first installation in the United States is providing results of 2% zinc in the clean coal and 4% float in the refuse.

With conventional dry-cleaning units, Mr. Waterman pointed out, bad results with attempts to reduce moisture variations through blending and surge bins have led to the conclusion that predrying is the preferable plan.

In the design of cleaning plants, the advent of the continuous miner has presented operators and designers with an unknown factor—the ultimate percentage of fines in the mine-run. While an improvement in continuous-mining results may be expected, designers at present have no choice but to provide for higher percentage of fines.

In cleaning, mass treatment of a wide range of sizes in a single unit is the rule, though many mines are classifying to permit cleaning the various fractions at the best gravities. More fines—often with a higher ash content—are factors dictating increased attention to cleaning rather than by-passing $\frac{1}{4}$ or $\frac{1}{2}$. Compound circuits providing for retreatment of middlings permit increasing the throughput of primary cleaners, and also provide a cleaner product or permit producing a higher-ash steam coal. In crushing and recirculating middlings to jigs, however, Mr. Waterman warned that minus $\frac{1}{4}$ must be removed before crushing to prevent buildup in the jig.

After washing, the minus $\frac{1}{4}$ normally is screened out for dewatering—usually by horizontal compression-type screens. For more exact results, vibrators may be employed and the fines run over desliming screens followed by centrifugal drying equipment. Depending upon type and size of coal, such equipment reduces the surface moisture to 6 to 12-14%. But where the ultimate in low ash and low moisture is required, thermal drying is necessary. New designs of thermal equipment promise major increases in the efficiency of drying $\frac{1}{4}$ in or 10 mesh.

In the field of crushing, said Mr. Waterman, stage crushing—consisting of preliminary breaking, screening, recrushing of the coarse fraction, rescreening of this fraction and recirculation of the oversize—has the advantages of high flexibility and low output of fines. And with the downward trend in lump demand and the increased emphasis on a better product, the trend is toward a flowsheet that provides for precrushing, washing, classifying, and centrifugal and

COAL MEN ON THE JOB



SIMPSON CREEK COLLIERIES CO., Mine No. 3, Galloway, W. Va.: J. D. Gerrard (left), W. A. Hillyard, and Hubert Felton, section foremen; Ruben Maxwell, night mine foreman; Charles Gobel, Charles Lipscomb, Loving Mullaney and M. D. Ashby, section foremen; Ralph Bartlett, maintenance foreman; William Bland, mechanic; Sam Pasky and Albert Lechiera, section foremen.

thermal drying. Washed coal can be crushed, Mr. Watermann stated, and the thermal-dried product can be screened.

Discussion turned on the characteristics and proper use of rotary-screen breakers, on fine-coal cleaning techniques, on dust collection following thermal drying and on the possibilities of such new equipment as the cyclone with heavy media. Preliminary results with the latter were reported as good.

W. Va. and AIME Groups Meet in Charleston

(Continued from P 140)

Co., and L. C. McCabe, U. S. Bureau of Mines; Fred K. Prosser, general coal traffic manager, N. & W. Ry. Co., and Orville R. Lyons, coal-preparation engineer, Heyl & Patterson, Inc.

Cyclone-Thickener Operation—An installation (made in September, 1949) of Heyl & Patterson cyclone thickeners and an Oliver disk-type vacuum filter to close, so far as practicable, the water circuit in Kent plant of the Rochester & Pittsburgh Coal Co., Indiana County, Pa., was described in a paper prepared and presented jointly by G. Kennedy, R&P preparation engineer, and H. E. Crimer, research director, Heyl & Patterson.

"The system," the authors said, "has proved beneficial in the following ways: (1) it has permitted positive control of the circulating water solids; (2) the lower concentration has improved table performance; (3) flooding due to plugging of disposal lines has been substantially elimi-

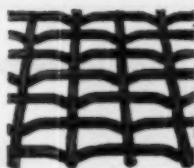
nated; (4) it has reduced the amount of coal lost to the silt ponds; (5) it has reduced the rate of abrasion in pumps and piping; (6) since the thickeners deliver the fines to the filter at the rate the fines are fed to the plant plus the fines produced by the plant, there is no appreciable slurry storage."

In this plant, operating three shifts per day, the tables wash $\frac{1}{4}$ -in x 0 coal at the rate of 140 tph. The $5\frac{1}{4}$ -in is washed by sand flotation. The tabled coal is centrifugally and thermally dried. Initially, the water-clarification unit was a solid-bowl centrifuge fed at a rate of 400 gpm of 30% solids. Bleed rate was 100 gpm at 12% solids, practically all smaller than 37 microns. Circulating water averaged about 25% and the cake 30% moisture.

Four banks, each consisting of 22 3-in cyclones, were installed. Ordinarily, one to three banks are in use at one time. Circulating water averages 12%, the vacuum filter (10 disks, each 8 $\frac{1}{2}$ ft) is producing about 12 tph (dry basis) and the total moisture of the cake is 21%. Maintenance of the cyclones will require new rubber liners about every 800 hr, new orifice pieces every 400 hr, and an orifice adjustment every 100 hr.

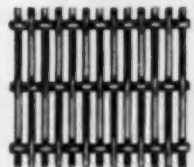
Recent experience with four 14-in cyclones installed at the Carpenter-town Coal & Coke Co., Westmoreland County, Pennsylvania, to change to a closed water circuit, where 10 tph of coal formerly went to the sludge pond, indicates that cyclone thickeners can be used to eliminate plant bleed.

Liquid-Solid Cyclone—"High-Speed Classification and Desliming With the Liquid-Solid Cyclone," a paper presented by D. A. Dahlstrom, assistant



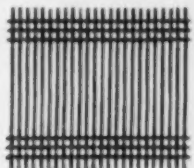
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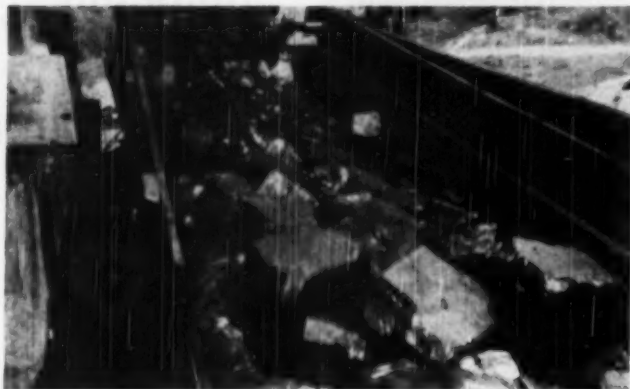
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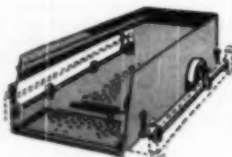


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professor, Department of Chemical Engineering, The Technological Institute, Northwestern University, went into detail on the theoretical considerations, laboratory tests with a 9-in 20-deg cyclone operated under various conditions, and tests of 20- and 14-in cyclones in two stages at the Ceredo (W. Va.) plant of the Truax-Traer Coal Co.

Among Mr. Dahlstrom's conclusions were: (1) desliming or classification up to the 200-mesh point is extremely successful; (2) initial and operating costs are small; (3) up to 90 to 95% of the slimes can be eliminated; (4) recovery of plus-100-mesh coal will be very close to 100%; (5) cyclone capacities can be up to 300 gph per square foot of floor space; (6) it is feasible to introduce a small amount of fresh water and greatly decrease the amount of slimes retained; (7) prolonged feed-solid concentrations over 18% should be avoided with one-stage cyclones to prevent loss of coarse coal; and (8) for severe changes in solid loading, the cyclone design should include a means for easy alteration of underflow diameter.

Robert Piro, Truax-Traer Coal Co., said that a rapid means of adjusting the underflow nozzles is necessary and that Rheolaveur rapid-change bushing nozzles have been applied to the cyclones in the Ceredo plant. The cyclones are subject to a wide variation in feed concentration of solids and the two-stage arrangement permits a wider range than single-stage.

Mr. Criner said that a western Kentucky cyclone-thickener installation recovers 64% of the feed solids with a separation at 30 microns and that Heyl & Patterson engineers generally recommend two stages. They also have tried adding "hydraulic water" but do it in the second stage cyclone. Tests at the Kent and Carpenterstown plants indicated that an equilibrium was reached in a few hours of operation without bleed, he added.

In answering a question, Mr. Dahlstrom said that achieving a totally enclosed water system would probably involve flocculating equipment to trap minus-10 to minus-20-micron material.

Sand-Flotation Process—W. H. Lesser, in a paper "The Chance Sand-Flotation Process," gave performance records for nine bituminous plants. In a summary, he said that these performances indicate: "(1) Bituminous coal of many different size consists of washing characteristics is cleaned at very high efficiencies; (2) cleaning specific gravities range from 1.40 to 1.60; (3) the sink material in the cleaned coal, at the washing gravity, varies between 1.05 and 0.10% by weight; and (4) the float material in the refuse, at the washing gravity, varies between 1.10 and 0.13 by weight."

The chance process was introduced in 1921 in the anthracite region,

which now has 46 plants and 107 cones ranging from 7 ft 9 in to 18 ft in diameter. Bituminous installations began in 1930 and today total 52 plants and 60 cones from 8 to 16½ ft. West Virginia has 21 of the 52 plants in the United States. England has 17 of the 29 installations in foreign countries. Mr. Lesser described the principles of operation and practice of the process, gave specifications for the sand required and pointed out the improvements that have been made.

Ohio River Stream Pollution—The industry "might thoroughly consider its position as the water-supply industry awakens to its rights" was the conclusion of a paper, "The Stream Pollution Problem In the Ohio Basin," by K. S. Watson, assistant director, Ohio River Valley Water Sanitation Commission. Dr. Watson offered no solution. He outlined the magnitude of the problem, set forth estimates to indicate the annual damage done by acid water flowing into rivers and discussed the preventive measures that have been tried.

About 2½ million tons of sulphuric acid yearly, he estimated, still is going into the Ohio River from coal mines—which is about the same as in the early thirties before \$7,000,000 was spent on sealing mines. No sealing or maintenance of seals has been done for 10 yr, although during that period new mines have been opened, strip mining has increased and many coal washers have been installed.

Amounts spent nationwide on research to reduce stream pollution to date and those spent in 1949 by industries are: coal, \$100,000 and \$22,000; pulp, paper and board industry, \$900,000 and \$155,000; sulphite pulp manufacturers, \$672,000 and \$120,000; canning industry, \$285,000 and \$40,000; petroleum, \$600,000 and \$35,000. The 1949 expenditure by the coal industry was made by the U. S. Bureau of Mines in a research program at West Virginia University. The U. S. Public Health Service has set up a number of control stations and the one for the Ohio River is at Cincinnati.

Stream-Pollution Research—S. A. Braley, of the Mellon Institute, in a paper on "Recent Research on Acid Mine Water Drainage," described the research work done by his organization and, although he offered no solution, he pointed to the answer in this statement: "The pollution problem thus is one of water entering the mine, as it must first be contaminated before it can carry the contamination to the outside stream."

Comparing it to "published information and common conception," he summarized his data as follows:

"1. Acid is produced by oxidation of sulphuritic iron in and associated with coal measures. This reaction is a normal chemical reaction and follows a constant equation.

"2. The amount of acid delivered by a mine is not the amount produced

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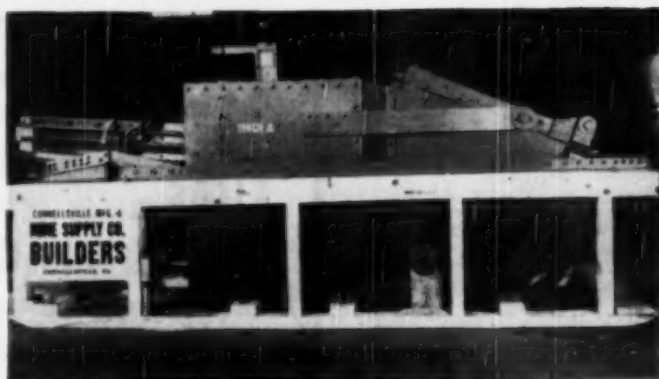


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but is proportional to the transporting agent, which is the volume of water flowing through the mine.

"3. The rate of acid production is not equivalent to the cube of the oxygen concentration, but more near-

ly proportional to the reciprocal of the value.

"4. pH measurements in no way represent either the concentration or poundage of acid produced or delivered by a mine.

"5. The delivery of acid from mines follows regular patterns, varying in degree but not in kind when sampling intervals are short and sufficiently continuous to determine the pattern. Since they deal with water flow, which is dependent upon precipitation and ground water levels, they fluctuate with seasonal and daily precipitation. Annual, semi-annual or quarterly sampling only results in confusion of data.

"6. The study of mine acid and its ultimate control should be based on intensive study of a few mines rather than a meager study of many.

"7. The production of mine acid is a process of nature and while it operates on all coal measures, it is materially increased by any natural formation that results in ultimate exposure of the reactive constituents."

Acid Mine Drainage in Pennsylvania—"Abatement of one of the major pollutants, acid mine drainage from bituminous mines, is yet to be attained," was one of the conclusions of a paper, "Pollution by and Control of Acid Mine Drainage," prepared by L. S. Morgan, division engineer, Pennsylvania Department of Public Health, and George D. Beal, assistant director, Mellon Institute of Industrial Research.

Other points in the summary and conclusions of this paper were:

"1. Pennsylvania has powers by legislation to control stream-pollution sewage, industrial waste, silt from coal-preparation plants and acid mine drainage from coal mines, except



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where such acid drainage is to polluted or unclean streams.

"2. Decisions of the State Supreme Court have held that (a) pollution of a stream devoted to public use as a source of public water supply by acid mine drainage is an enjoined public nuisance and (b) that no mine can be opened, reopened or change its plan of approved drainage without first securing approval of drainage plans from the Sanitary Water Board.

"3. Pollution of streams by acid mine drainage in the bituminous coal field of Pennsylvania is widespread and adversely affects the waters of streams devoted to public use.

"4. The only progress in control of pollution by acid mine drainage at its source has been through the mine-sealing program undertaken by governmental agencies. Significant benefits have been obtained through flow augmentation by the discharge of impounded water from multi-purpose reservoirs constructed by governmental agencies.

"5. Pollution from coal silt produced at preparation plants is rapidly being brought under control through construction of reclamation and treatment plants by the coal mining industry."

The decade 1940 to 1950 brought a slight improvement in acidity in the Allegheny, Monongahela and Youghiogheny Rivers. Among the possible factors responsible for improvement were the sealing of mines, abandonment of a number of mines, with the increase in water level thus sealing off air, and the operation of the multi-purpose reservoirs.

Combustion Tests of Virginia Coals
—Results of burning tests of straight Virginia-anthracite culm and mixtures of that culm and bituminous coals under a new 60,000-lb-per-hr boiler equipped with Detroit Rotogrator stoker at Virginia Polytechnic Institute were presented in a paper by G. Hardy Long, assistant professor, Mechanical Engineering Department, and Oscar Coplon and Claude W. Kilby, power and fuel graduate students.

The installation includes a dust collector and equipment to recycle the dust and cinders to the furnace. When using 23%-ash anthracite culm from one old pile, the boiler would not operate to capacity. With culm from newer piles ranging from 17 to 23% ash, the boiler performed at rated capacity.

Tests were made with 80-20, 60-40, 40-60 and 20-80 mixtures of bituminous and culm from the poorer old pile. Results indicated that the greatest economy might be expected with a mixing ratio of 85-15. It is hoped to continue the tests with varying quantities of excess air, at different grate speeds and different quantities and pressures of jet air.

Auger Mining Developments—Labor costs "at the machine" were all in the 40- to 60c-per-ton range, except one at \$1.02 per ton at 12 mines working



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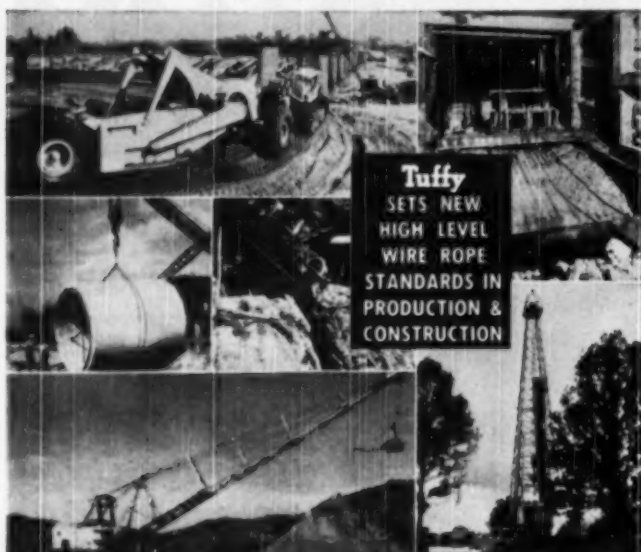
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16- to 36-in augers in highwalls, according to a paper on "Primary and Secondary Mining With Auger Equipment," prepared and presented by Donald M. Bondurant, assistant professor of mining engineering, School of Mines, West Virginia University. Other costs per ton were found or estimated as follows: depreciation, 20c; repair and maintenance, 20c; fuel for auger and conveyor, 10c; bit cost, 1c; and insurance, 3c. These with the 70c labor cost, total \$1.24 per ton. "These figures substantiate the fact that some operators are mining coal on a contract basis for less than \$3 per ton," Mr. Bondurant pointed out.

"Auger mining," he said, "holds tremendous possibilities for underground operations." A Cedar Grove-seam mine in West Virginia, with very bad roof conditions, now is being developed with entries 14 ft wide for use of an underground auger 30 in in diameter and equipped with a lump-getting head. This machine, equipped with 33-hp permissible motor, has been used on highwalls to a depth of 60 ft and it is expected that 75- to 100-ft holes can be drilled without overheating the motor. It is assumed that a crew of three men will average 100 tons per shift.

Coal Analyses and the User—"A Study of Coal Analyses From the Standpoint of the User," a 16-p paper with eight additional pages of data and graphs, by Fred M. Reiter and Robert F. Andres, Dayton Power & Light Co., and presented by Mr. Reiter, discussed in detail evaluations of analysis data and significance for power-plant use. Mr. Reiter said that his job is to analyze analyses for one user only. "I am in the procurement end of the business, not in the boiler plant and not in the laboratory. I am not a buyer," he explained.

Conclusions set out in the paper included the following: (1) regardless of the method of sampling, if enough samples are taken the over-all average will become a fairly representative value; (2) individual samples improperly taken cannot be depended upon to give acceptable analyses; (3) to help judge the validity of any coal analysis, the laboratory sheet should record the size and number of increments and the weight of the gross sample taken; (4) a sizable error can be introduced into the final analysis by improper packing and a time delay in sending the samples to the laboratory; (5) laboratory chemical determinations are generally dependable, especially after the reliability of the laboratory has been established; (6) coal that ran 14,000 Btu as received 10 yr ago seems to have fallen considerably from that quality, but improvement recently has been noted from many sources; (7) many users are now looking at the cost per million Btu as received in the boiler, rather than asking "What seam or mine is it from and what is its job mine price"; (8) the disposal

COAL MEN ON THE JOB



ESLEY SISSON, foreman, shovel pit, and Walter Shoemaker, foreman, dragline pit, Blackfoot Coal & Land Co., Oakland City, Ind.

of stoker cinders is no problem today; in fact cinders often can be made a source of revenue; (9) everything else being equal, low sulphur will be favored because it usually means low fusion and because some present-day heat exchangers bring the flue gases down below their dew points and permit formation of corrosive liquids; (10) moist coal sticks in the cars, rusts the equipment, jams the pulverizers and becomes a general nuisance to the power plant operators. In discussing freezing problems, Mr. Reiter said that "The use of chlorides is not acceptable to us."

Rocky Mountain Institute In 46th Annual Meet

(Continued from p. 149)

to 10 tpm, without slewing the tractor treads. Other features are self-cleaning shoes and sprockets, smooth continuity of coal movement on the single-chain conveyor, simplified hydraulic system for easier maintenance, and separate gear transmissions and multiple-disk clutches on each tread.

The machine is unit-assembled, no electrical units are installed under the main conveyor, and the loader can be disassembled within its own height, Mr. Clemens pointed out.

Roof-bolting prevents immediate roof strata from sliding on the bedding planes and prevents sag, Mr. Morgan said in citing Bureau of Mines' theories on the function of bolts. Experimental bolting now is being conducted at 13 coal mines in the Rocky Mountain region, with an estimated 300,000 sq ft of roof supported.

About 75% of the bolts now being installed are of the split-rod-and-wedge type, with stopers and air-

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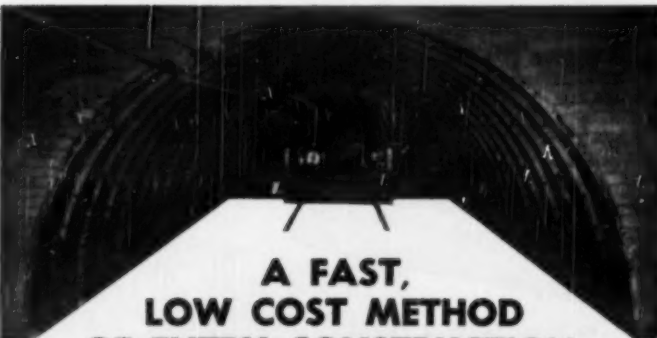
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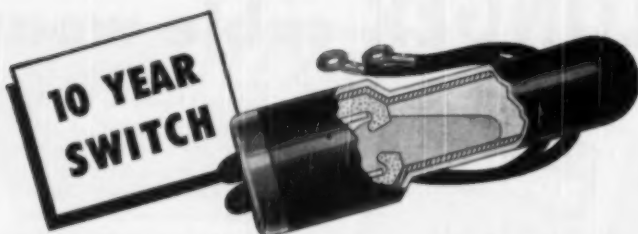
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operated impact wrenches drilling the holes and tightening the bolts. Mr. Morgan pointed out that nuts should be tightened to a minimum of 275 ft-lb torque in the light of recent investigations. Also, split-rod-type bolts are not patentable and can be made in the mine shop.

Close supervision of drilling is necessary if hole depth is to be kept within proper tolerances, Mr. Morgan said, because bolt will not seat properly if the hole is too long and will protrude too far if the hole is not deep enough.

On the problem of dust control, Mr. Morgan outlined two possibilities being studied to reduce the dust hazard. One is a dust collector that will collect dry dust at the collar of the hole as it is produced; the other is a foaming agent to make wet drilling more effective with less water.

Roof bolts cannot perform wonders, Mr. Morgan warned. They do a good job if properly installed and if enough of them are used, but the tendency to use fewer bolts or widen working places excessively should be discouraged.

Bad roof in the lower Sunnyside seam was cited by Mr. Peperakis as the main factor in his company's decision to experiment with and finally adopt roof-bolting at Sunnyside No. 2 mine. The seam has no included rock but in 1949 refuse taken from the mine amounted to 22.5% of the clean-coal output. Most of this rock came from the 2- to 26-ft thick interval between the upper and lower Sunnyside seams.

The first experiment was conducted at a four-way intersection where the separation between beds was from 10 to 12 ft of weak shale and seeping water in the shale aggravated the condition. Crossbars on 2-ft centers could not hold this roof in many instances. Therefore, it was felt that if roof-bolting worked here it would be especially valuable in other sections of the mine.

Bolts 6 ft long were spaced about 4 ft apart in both directions and crossbars were set. Mr. Peperakis reported that after a few days the roof took weight and some of the plates were distorted. However, the intersection still stands while nearby non-bolting intersections that were heavily timbered have collapsed. Now, 4,000 ft of entry, 750 ft of crosscuts and 1,300 ft of rooms are bolted.

Mr. Peperakis concluded by citing timber savings since roof bolting was started as follows:

Timber Used (Linear Ft. per Ton)	
First half, 1949 (before bolting).....	2.05
Second half, 1949 (limited bolting).....	1.64
First 3 mos, 1950 (expanded bolting).....	1.27
Savings in timber, ft per ton.....	0.78

Based on present rates of production, this means a saving of approximately 550,000 linear feet of timber per year.

Pneumatic tools for roof-bolting are being developed and improved, Mr. Shaw declared, to keep pace with in-

creasing acceptance of bolting and to speed the bolting operation. Using slides to point out operating principles of stoppers, impact wrenches and compressors, Mr. Shaw stressed the importance of good maintenance and intelligent operation based on complete knowledge of these machines.

Impact wrenches now are being produced which exert enough torque to break a 1-in bolt. However, 275 to 300-ft-lb usually is enough to slightly distort the bearing plate and this is as far as the nut should be turned, Mr. Shaw said. Stationary and portable compressors are undergoing design changes to fit them into the roof-bolting operations to greater advantage.

Increased safety and lower cost for roof support are benefits of roof-bolting at Koehler mine, St. Louis, Rocky Mountain & Pacific, Mr. Van Sant reported in outlining his company's experience in controlling treacherous roof with 5-ft-long bolts.

The seam averages 6½ ft in thickness, and is topped by 12 to 18 in of bone which has the same cleat as the coal. The shale above the bone is carbonaceous and grades into siltstone at the level where the expansion-type bolts anchor in the roof. The strata are not laminated, and the shale has slips, pots, slickensides and spars which cannot be seen in the underlying bone and top coal.

"We prefer," Mr. Van Sant said, "to believe that in our case bolting builds up a beam of interlocking keystones, rather than the accepted laminated beam usually alluded to in roof-bolting discussions."

The 5-ft-CF&I bolts are installed with an Ingersoll-Rand stopper using a starter and two changes of steel, with screw-on bits and an air-operated impact wrench for tightening the nuts.

Mr. Van Sant described an area in Koehler mine where, with west entries on the butt and north and south entries on the face of the slips, it was found that rows of four bolts with 8-in square plates on 5-ft centers would adequately support the 12-ft-wide west entries. However, when this same pattern was used in the entries driven on the face of the slips it was not satisfactory because the bone above the coal had a tendency to fall out between the bolts. No general falls occurred but the condition was hazardous. It was remedied by bolting steel lagging across the slips at approximately 45 deg in a herring-bone pattern.

A pull test on a bolt in one of the west entries showed that the bolt withstood a pull of 31 tons without dislodging. A hydraulic jack with a 60-ton pulling capacity was attached to a bolt in the entry. At 17 tons, the bolt slipped about 4 in but then tightened up again. At 31 tons, the guide rod on the jack broke to terminate the test.

The following figures were presented by Mr. Van Sant to show savings



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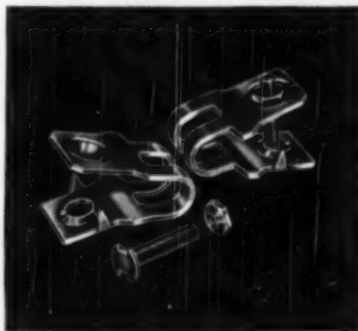
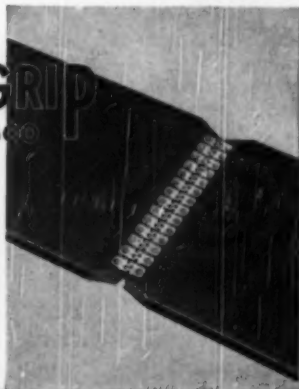
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his company realized in bolting an intersection with a roof area of about 1,000 sq ft.

Roof-Bolting	
66 bolts @ \$1.25.....	\$ 82.50
3 shifts @ \$15.00	45.00
Total	\$127.50
Timbering	
Timber	\$ 32.00
14 shifts	216.00
Total	\$248.00

The saving is \$114.50 in favor of roof-bolting. Some intersections require steel I-beam and concrete-crib supports in addition to timber. Roof-bolting has eliminated the need for steel and concrete, thereby adding \$300 to the savings already mentioned.

Bolting 180 ft of entry saved \$88.87 over previous methods, Mr. Van Sant reported.

Experiments in pillar extraction between roof-bolting rooms are now underway at Koehler. Previously, re-timbering, and sometimes a third timbering, were required before the pillar between 300-ft-long rooms could be recovered. Results to date indicate that bolting is a definite improvement, costwise and tonnage-wise. The increased production, Mr. Van Sant stated, results from the following advantages of roof bolting:

1. Added clearance over the car for the loading machine boom.
2. Danger of knocking down cross-bras is removed.
3. Haulage crew efficiency is increased by more clearance at room necks and along haulageways.
4. The loading crew receives better protection at the immediate face.
5. Props and temporary cross-bras at the face no longer hinder loading.

These advantages also result in increased safety, Mr. Van Sant said.

In the discussion on roof-bolting, Mr. Morgan stated, in answer to a question, that it is possible to apply too much torque in tightening nuts. At 450-ft-lb, he said, the steel bolts begin to stretch, and in friable roof even 300 ft-lb may be excessive because plates could be pushed into the roof, thereby causing fractures. Mr. Morgan also reported that investigations with open-seam steel tubing are underway, the tubing being expanded in the hole to give intimate contact throughout between the sides of the hole and the tubing. F. W. Koelling, superintendent, Phelps Dodge Corp., Dawson, N. M., reported the use of bolts and plank lagging to prevent sloughing from ribs. Planks, bolted to the rib vertically by a bolt near the bottom and one near the top, effectively control sloughing. Calling for caution in roof bolting, Earl R. Maize, safety director, National Coal Association, Washington, D. C., warned against excessive widening in bolted places and suppression of any attempts to cut down on the number of bolts used.

R. L. Hair, general superintendent of mines, Colorado Fuel & Iron Corp.,

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Pueblo, Colo., reported the successful use of bolts and steel-channel lagging in controlling roof that does not show definite laminations but shows slips and faults.

The consensus was that minimum standards and bolting patterns should be adopted, and that these should be based on preliminary experiments.

Mine planning and development and continuous mining were the subjects of the Tuesday morning session. Speakers were John Sidle, general superintendent, Clayton Coal Co., Denver, Colo.; W. J. Phillips, assistant to the president, Sunnyside Coal Co., Pittsburgh, Pa.; and A. Lee Barrett, development and research engineer, Joy Mfg. Co., Franklin, Pa.

New Lincoln mine of the Clayton Coal Co., Denver, Colo., is laid out and is being developed to take full advantage of continuous mining machines served by shuttle-car and belt haulage, Mr. Sidle said, in describing this modern plant engineered for 300 tph. A steel-lined slope 1,800 ft long, and a 430-ft-deep air shaft, also steel-lined, provide access to the 9-ft-thick Laramie formation. At present, two ac-powered Joy continuous miners and two Joy 11BU loading machines are driving entries north and south from east mains. Each mining unit is served by two 6-ton shuttle cars, one car at each continuous miner serving as a surge unit.

Entry belts feed the main slope belt which discharges to a modern tippie designed for direct loading to railroad cars or for storage of over 1,000 tons in seven steel bins. Mine-run coal is crushed to minus 2½ in, since all production at Lincoln is shipped to industrial users, Mr. Sidle said.

A description of Lincoln mine starts on page 86 of this issue.

Reviewing the Colmol's operating principles and construction features, Mr. Phillips pointed out that the first low-seam model is now working in a northern West Virginia mine. The machine makes a cut 9 ft 6 in wide and from 32 to 61 in high, depending on the upper gear case used. The machine in West Virginia mined a 51-in seam, including a 3-in hard clay binder which was brought out in sizable chunks with no apparent excessive damage to the carbide-tipped bits, Mr. Phillips reported. The machine was used to drive three 12-ft-wide entries on 60-ft centers and crosscuts between entries at 45 deg on 70-ft centers.

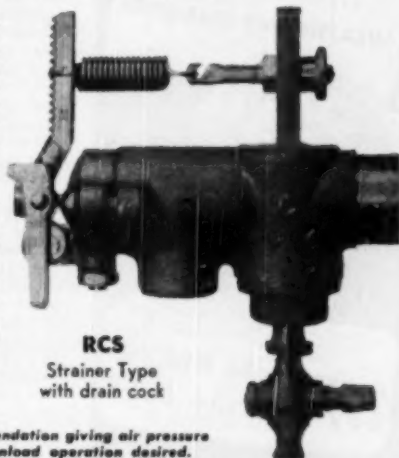
Two 5-ton shuttle cars haul from the Colmol to a 30-in entry belt, which at first was extended with every 150- to 200-ft advance. Production was increased when the belt extension interval was shortened to 75 to 100 ft to cut shuttle-car haul distance. In instances where the haulage distance was necessarily over 200 ft, it was found advantageous to have the surge car leave the Colmol and transfer its load to the transportation car enroute, Mr. Phillips said.

Normal production was 225 tons

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per 7-hr shift, with time studies showing that the Colmol was working only about one-third of shift time. This low operating time is a result of problems encountered in intermediate haulage, but Mr. Phillips stated that investigations by manufacturers and operating officials should result in intermediate haulage systems that will place coal in the main haulage units at a rate of 5 to 10 tpm.

A five-man crew, consisting of operator, utility man, two shuttle-car operators and timberman, drive an average of 112 ft of 12-ft entry per shift with the Colmol, thus permitting better supervision because of concentration of production, Mr. Phillips pointed out.

The Joy continuous miner is the outgrowth of a machine developed in Colorado by Carson W. Smith and Harold Silver, Mr. Barrett said in reviewing some of the changes in the original design, such as higher speed, wider cutting head, improved conveyors, collecting scrolls for fines and improved power-transmission systems.

Reporting that approximately 30 machines are now in actual service throughout the country, Mr. Barrett said that experience gained by observing these machines will result in further improvements.

Commenting on the advantages of continuous mining, Mr. Barrett enumerated the following benefits:

1. Smaller open areas permit better roof control and increased safety.

2. Better supervision results from localized workings.

3. Time required to bring a mine to full production is greatly reduced.

4. Absence of shooting results in uniform evolution of gas from seam and fewer gas-emitting fissures in top and bottom.

5. Speed of advance and retreat limits air-lacking of roof.

On the problem of intermediate haulage, Mr. Barrett reported that Joy is developing an extensible conveyor that may open up new mining possibilities.

The size consist of continuously mined coal was described by Mr. Barrett as follows: In highly friable seams, continuously mined coal is coarser than shot coal; in cleated seams, size consist is similar under both methods of mining; in hard seams, continuously mined coal is finer than shot coal. While these conditions generally apply, Mr. Barrett said, roof pressure also has a marked effect on size consist, with some weight on the coal resulting in coarser product.

Predicting that continuous mining will change the nature of mining as much as mechanization did, Mr. Barrett concluded that advances in auxiliary services will result in different-looking coal mines in the near future.

Safety and efficiency in western coal mining was the theme of a symposium and open forum at the final session Wednesday morning, with Mr. Sorenson presiding and Thomas Allen,

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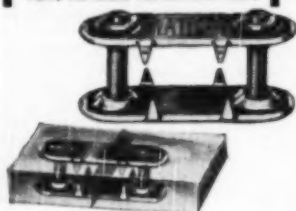


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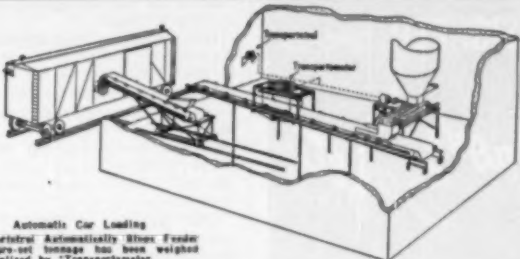
chief, Colorado coal-mine inspection department, chairman and moderator. Panel members were: R. H. Dalrymple, state coal mine inspector, Salt Lake City, Utah; E. H. Denny, chief, accident prevention and health division, U. S. Bureau of Mines, Denver, Colo.; Lyman Fearn, chief state coal mine inspector, Rock Springs, Wyo.; K. V. Cammack, U. S. Geological Survey, Denver; John A. Garcia, chief inspector of mines, Albuquerque, N. M.; Walter J. Johnson, president, Sheridan-Wyoming Coal Co., Monarch, Wyo., and Earl R. Maize, safety director, National Coal Association, Washington, D. C.

Commenting on means of reducing roof- and rib-fall accidents at the face, Mr. Johnson offered education of the worker in the hazards of his job as one of the most effective remedies. Also necessary for a good job are well-trained supervisors, safety-minded management and cooperation among labor, management and government agencies. Mr. Maize stated that mining systems must be planned to provide best-possible control under existing local conditions, and Mr. Dalrymple added that standard timbering, with props set on pattern regardless of the sound of the roof, is a necessity. Mr. Allen declared that pillar extraction may be a thing of the past, with mines in the future being planned so that narrow pillars may be left for adequate roof support.

On the question of whether to seal or ventilate abandoned places in coal mines, Mr. Denny was of the opinion that sealing may be better because of the difficulty of determining the adequacy of ventilation in some abandoned areas. Good seals with access pipes for taking samples naturally would be necessary, Mr. Denny said. Mr. Fearn declared that many mines would not be able to operate without sealing in such areas, while Mr. Allen, also favoring seals where necessary, pointed out that seals should be properly constructed of concrete, except in squeezing zones.

Mr. Johnson described a seal at Monarch constructed of 6x6-in wood blocks covered by metal lath and plaster. Daily patrols of seals are necessary because squeezes may affect them and give unexpected trouble, Mr. Johnson warned. Mr. Dalrymple advocated a bleeder entry where seals have been constructed. Mr. Garcia spoke against sealing in lignite mines where the danger of spontaneous combustion is present.

From the floor, R. L. Hair, CF&I, mentioned a seal placed at his company's Morley mine 25 yr ago, where the worked-out area was sealed on the intake and 6-in pipes were conducted from the seal to the return in a successful application. Mr. Cammack, answering a question from the floor on how to make a good seal, described an actual installation where wooden front and back walls, with a clay fill between, served effectively. Tapered wood blocks, 18-in long were driven into the walls after construc-



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tion of the seal to tighten the blocks already in place.

Questioned on the availability of training for prospective mine officials in the western states, Mr. Dalrymple led off for the panel by reporting that Carbon Junior College, Price, Utah, has prepared a course for local use by interested companies. Mr. Maize outlined the high school training being offered in Ohio under sponsorship of the Hanna Coal Co.

The Bureau of Mines' accident-prevention training program was described and recommended to operators by Messrs. Fearn, Denny and Johnson. Mr. Cammack acquainted the group with the formal extension program of an eastern state where night classes under local instructors are a cooperative effort among the state college, state department of public instruction, local school officials and mining interests. Instructors' salaries are paid from federal and state funds available to any state.

On the question of whether small non-gassy mines, employing two or three men and having no electric power, should be rock-dusted, the panel agreed that rock dusting should be done in compliance with state and federal recommendations.

On proper methods of planning and working coal mines for greater safety, Mr. Cammack declared that one of the first planning steps should be an investigation of the mine law to determine legal requirements. A. M. Keenan, associate professor, Colorado School of Mines, Golden, Colo., said the object of engineering training is to give to the industry good engineers who can produce well-made plans, and who are versatile enough to adapt their plans to the actual operation.

On the desirability of rewarding supervisors for good safety records, Mr. Cammack noted that some companies assign a certain amount of monetary credit to each boss at the beginning of a year, this fund being depleted by a certain standard amount for each accident in that supervisor's section throughout the year. Any balance in the fund at the end of the year is awarded to the boss as a bonus. Mr. Johnson reported the successful use of this bonus system by an eastern coal company.

Queried as to their experience with small mines employing 10 men or less, the panel agreed that compliance with mining laws usually is lax and accident rates are higher in such operations. Pointing out that small mines need a lot of attention, Mr. Garcia said that inspectors should also be instructors at these operations because knowledge of good mining practices often does not reach these men. Mr. Maize cited accident statistics in Kentucky where national figures are reversed because of the strict attention given to the smaller mines. Instruction and pressure for mine-law compliance, Mr. Allen said, will improve safety at most small mines.

On the advisability of prohibiting

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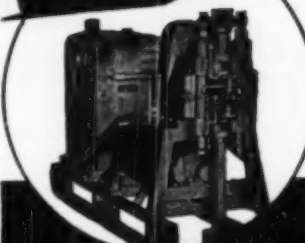
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black powder in coal mines, Mr. Maize declared that its use should not be permitted, especially since permissible explosives have been developed. Mr. Garcia stated that he will recommend to his state legislature that black powder be outlawed in the coal mines of New Mexico. Development of permissible, regulations against black powder use and the resulting lack of market have greatly curtailed production and shipment of this explosive, R. H. Summer, du Pont representative in Denver, said.

On the use of diesel engines underground, Mr. Denny pointed out that proper maintenance can keep CO down to 0.25% if sufficient ventilation is provided. Each diesel unit requires about 10,000 cfm for effective dilution and removal of exhaust gases, Mr. Denny said. Possible advantages, in addition to economy, are greater mobility and lack of electrical hazards in mine openings. Diesel units have definite possibilities, Mr. Denny added, but the problems of ventilation and possible worker complaints will have to be solved.

Mr. Keenan described successful European applications of diesel haulage equipment and recommended carefully controlled experiments to determine their fitness for American mining. Diesels will soon have a trial in an eastern mine, Mr. Maize reported. Diesel haulage in separate entries, with these haulage entries ventilated as separate splits, is a possible solution, in Mr. Allen's opinion.

On promoting safety in storing and handling explosives it was agreed that proper training, strict supervision, adequate transportation facilities for explosives, and well-designed magazines are vital.

The three-day meeting closed with a business session at which officers were elected for the coming year.

Coal Publications

The following publications by the U. S. Bureau of Mines may be obtained free upon request to Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa. All are 8x10 1/2-in.; paper; mimeo.

List of Respiratory Protective Devices Approved by the Bureau of Mines, by S. J. Pearce and L. B. Berger. I.C. 7570. Devices approved to June 1, 1950, with photographs.

Achievements in Mine Safety Research and Problems Yet to Be Solved, by A. C. Fieldner. I. C. 7573. 31 pp. Review of progress since 1910 and problems in explosives, explosions, ventilation, electrical and mechanical equipment and roof control.

The following bulletin by the Bureau of Mines may be obtained from the Supt. of Documents, Government Printing Office, Washington 25, D. C.,

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Safety in the Mining Industry, by
D. Harrington, J. H. East Jr. and
R. G. Warneke. Bulletin 481. 102 pp.
40c. Statistics and comment on coal,
metal and non-metallic mining; quar-
rying and petroleum. Miners' health
and trends of fatal accidents.

**High-Sulfur Pittsburgh Coal: Up-
grading in Southwestern Pennsylv-
ania and Northern West Virginia**,
by Thomas Fraser, W. L. Creutz and
A. L. Bailey. Bulletin 483. 70 pp. 30c.
Practicable limits on reduction of
sulfur to produce a useful metallurgical
coal.

The Isosynthesis, by Helmut Pich-
ler and Karl-Heinz Ziesecke (trans-
lated by R. Brinkley). Bulletin 488.
39 pp. 20c. The most satisfactory
compounds for high-octane liquid
fuels are the isoparaffin hydrocarbons.
This bulletin describes a process by
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preparing isoparaffins.

**Proceedings: Fifth International
Conference of Directors of Mine
Safety Research**, by H. P. Greenwald
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Papers and discussions on industry-
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The following are available from
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**Rating Employee and Supervisory
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New York 18, N. Y. 192 pp. 5 1/2 x 8 1/2-
in.; paper. \$3.75. How to rate sub-
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**Competing Fuels and Railroad Coal
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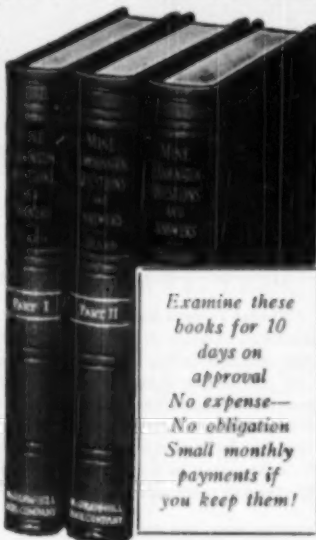
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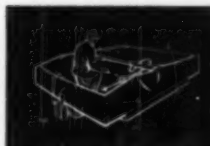
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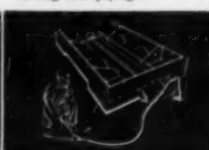
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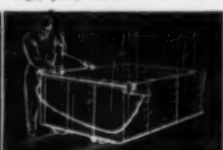
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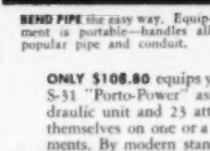
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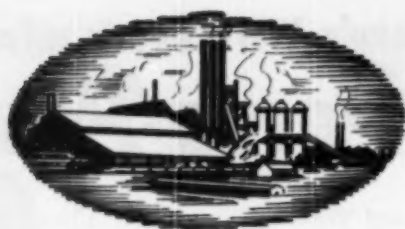
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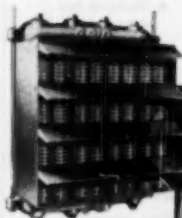
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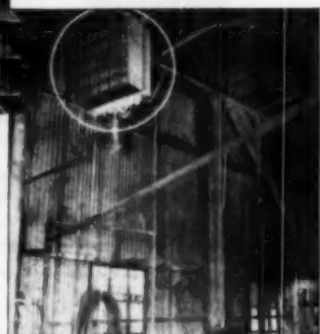
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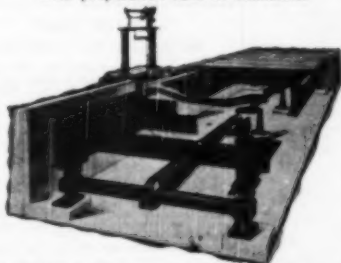
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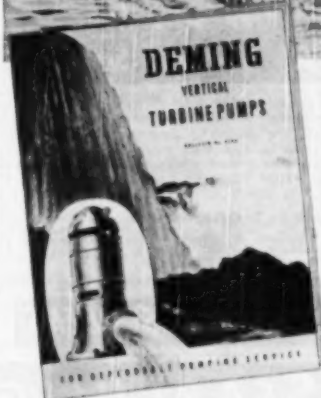


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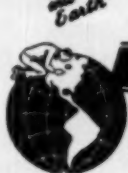
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2-4200" Ingersoll-Rand, Type PRE-2, Size 35 x 29 1/2 x 24, Direct Connected to 700 HP, G.E. Syn. TS Motors, 440/660/1200/4000 Volts AC.

LOCOMOTIVES

2-30 T JEFFREY 250 V. MH-77 48-34" Ga.
2-30 T JEFFREY 250 V. MH-77 48-34" Ga.
2-15 T JEFFREY 250 V. MH-77 48-34" Ga.
1-13 T JEFFREY 250 V. MH-77 48-34" Ga.
1-13 T GOODMAN 250 V. 136-8 48-34" Ga.
1-10 T JEFFREY 250 V. MH-10 48-34" Ga.
1-10 T G.E. 250 V. MH-82A 48-34" Ga.
2-10 T GOODMAN 250 V. 36-8 48-34" Ga.
1-8 T WEST. 250 V. ML-90A-C 44-34" Ga.

LOCOMOTIVE MOTORS

2-Jeffrey 250 V. MH-77, Ball Bearing
2-G.E. 500 V. MH-82A, Ball Bearing
2-WEST. 250 V. ML-90A-C, Ball Bearing
2-WEST. 250 V. ML-90A-C, B. B. (New)
1-WEST. 250 V. ML-90A-C, Ball Bearing
2-WEST. 250 V. ML-90A-C, Ball Bearing
2-WEST. 250 V. ML-90A-C, B. B. (New)
1-WEST. 250 V. ML-90A-C, Ball Bearing
2-G.E. 85/125 V. MH-82A-A, Ball Bearing

LOCOMOTIVE ARMATURES

MH-77-250 V. MH-78-500 V. 90A-C-500 V.
90A-C-250 V. 90A-C-250 V. 90A-C-250 V.
90A-C-250 V. 158-C-250 V. MH-82A-A-500 V.
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7 1/2 h.p. G.E. 1 V. 600/1200 r.p.m.
7 1/2 h.p. G.E. 220 V. 1150 r.p.m.
5 h.p. G.E. Vertical, 220 V. 900 r.p.m.
5 h.p. G.E. V. 150/300 r.p.m.
5 h.p. West. 220 V. 435 r.p.m.
1 h.p. G.E. 220 V. 435/2100 r.p.m.
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1--42" x 125' Robins Conveyor, same specifications.

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2--100 kw., same as above with 220/440 V. New A.C. Generators.

1--60 kw. West 250 V., D.C. dir. con. to NEW P.H. Diesel Engine.

2--35 kw., 250 V., D.C. NEW GAS or GAROLINE Engine Generator Sets.

4--37 1/2 kw., 220/440 V., 3 ph., 60 cy. NEW Gas or Gasoline, also Diesel Engine Generator Sets.

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HP	MAKE	TYPE	SPEED
200	West.	slush proof	900
250	Allis-Ch.	ball bearing	1750
175	G.E.	ME	450
150	West.	ME	500
125	G.E.	CD	600
125	Contour	slush proof	1800
100	West.	RK-100	500
100	West.	R	625
75	G.E.	CDM	1800
40 NEW	G.E.	DC-slush proof	550
40 NEW	West.	RK-125	550

D.C. Generators—230-275 V.

KW	MAKE	TYPE	SPEED
250	West.		1200
200	West.	RK-210	600
150	West.	RE	600
110	West.	RE-100	700
100	West.	R	720
100	West.	R	850
100	G.E.		900
75	Allis Chalmers	R	720
75	West.		850
60 NEW	G.E.	CD	1150
40 NEW	West.	RK-125	1150

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No.	KVA	Make	PRIMARY	Sec.
3	500	G.E.	2500	220/400
6	350	Maloney	2500	220/400
3	200	G.E.	2400/4160V	240/400
3	150	West.	2400/4160V	240/400
3	150	P.W.	2500	220/400
1	100	Pureless	2500	220/400
3	75	West.	2500	220/410
3	75	West.	12500/6000	2200
3	37 1/2	Packard	2500	110/200
2	25	Maloney	2500	115/200

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OTTUMWA HOIST: cylindro-conical, 1" rope groove, hoisting range to 400', 150 HP AC 2300 volt motor, complete with all magnetic controls ready for operation, excellent condition.

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60 to 100 ton per hour capacity.....\$180.00
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All steel. Interchangeable with other well-known makes. Replaceable precision ball bearings. No bearing adjustments required. Easy to start and will run in cold weather. Rust-proof ball race; maintenance is negligible.

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42" belt.....\$34.00

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500 in stock including DC motors and gearhead. All guaranteed. Priced from 50% of manufacturer's list.

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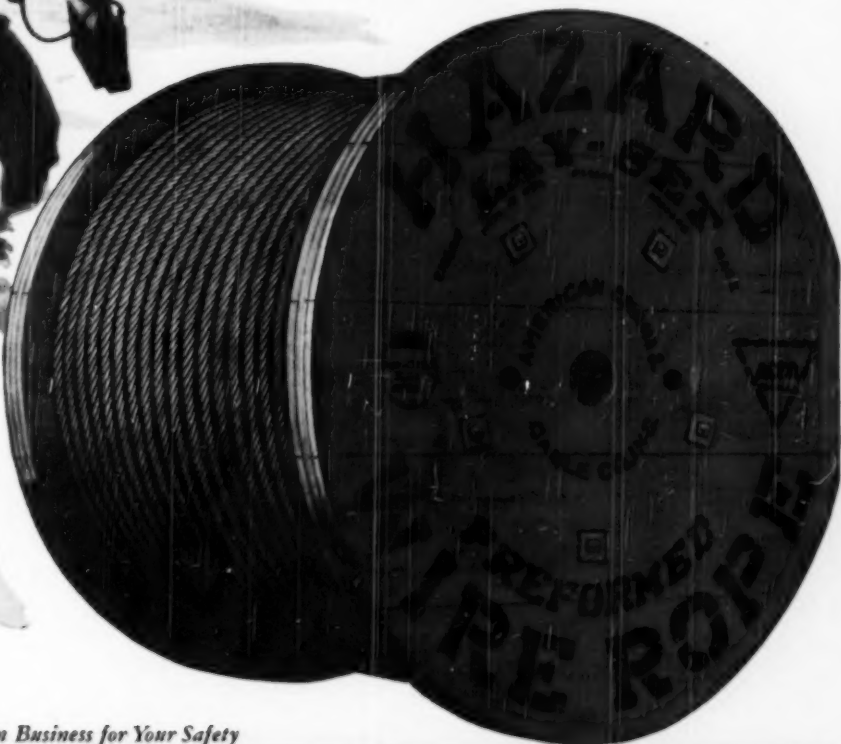
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2 signs of valuable "finds"



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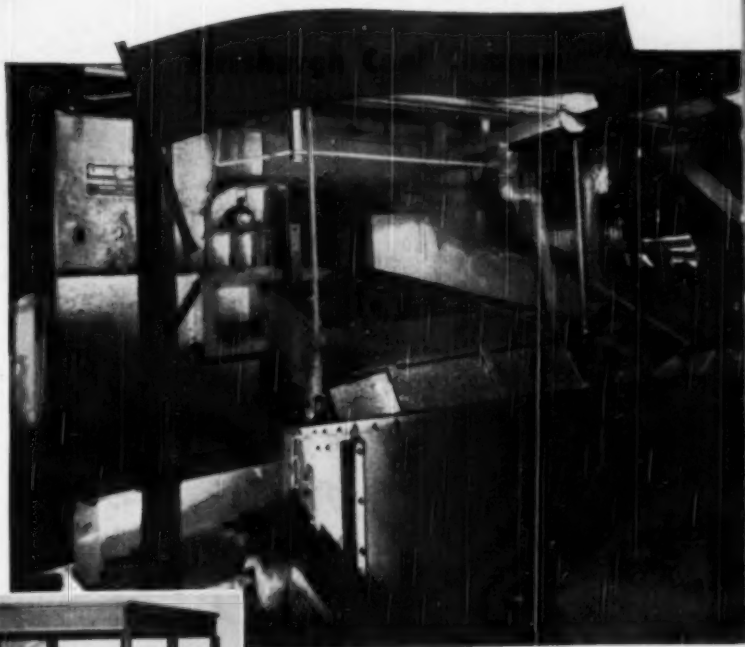
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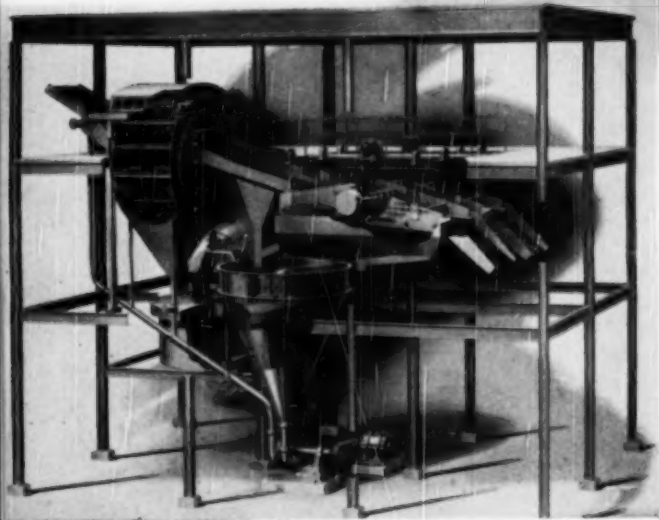
LINK-BELT

Float-Sink Concentrator for Heavy Media*

Drawing of Link-Belt Float-Sink Concentrator and auxiliary equipment shows concentrator, flumes, vibrating screens, thickener, sump, media circulating pump, and storage cone.



Direct view of cleaned-coal flume of SECOND L-B Float-Sink Concentrator unit at Champion #1 Plant of Pittsburgh Coal Company. Vibrating screen in foreground is where liquid media is drained and rinsed from float coal. Reject is discharged from concentrator to upper flume which extends to right.



*The Heavy-Media Separation Processes are licensed by the American Zinc, Lead and Smelting Company. American Cyanamid Company, 30 Rockefeller Plaza, New York 20, N.Y. are their sole Technical and Sales Representatives for these processes.

With one unit tested and proved in handling over two million tons, this major coal plant has installed a second Link-Belt Float-Sink Concentrator for further increases in coal-cleaning efficiency and output.

The new Link-Belt unit cleans 8" x 3" bituminous coal at a rated capacity of 290 tons per hour. The first unit, which has been in use since 1946, handles up to 250 tons per hour of 3" x 3/8" middlings.

Wherever increased output in mechanized mining puts greater emphasis on efficiency in the cleaning job, the Link-Belt Float-Sink Concentrator assures all these advantages—

One-man operation—reducing picking costs.

Uniform quality—improves marketability of coal.

Economy—relatively low capital outlay; low operating and maintenance costs; greater plant capacity in same space.

Flexibility—specific gravity of liquid media can be quickly changed; unit is quickly started or shut down.

Let Link-Belt engineers tell you more of this cost-reducing, high-efficiency process for automatic, volume-cleaning of coal. Get full details from our nearest office.

LINK-BELT COMPANY

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12,728



LINK-BELT

**COAL PREPARATION
and HANDLING EQUIPMENT**